FIELD CROP ABSTRACTS

Vol. 8 August, 1955 No. 3

REVIEW ARTICLE

NUTRIENT UPTAKE FROM LEAF SPRAYS BY CROPS

BY

GILLIAN THORNE

(Rothamsted Experimental Station)

INTRODUCTION

Interest in the absorption by leaves of nutrients from sprays has increased recently because the development of concentrated highly soluble fertilizers and the increasing use of machinery for spraying insecticides, fungicides and herbicides, and for overhead irrigation, facilitate the application of nutrients to crops in the form of sprays. It is frequently stated that the effects of nutrients applied to crops in sprays differ from those of nutrients applied directly to the soil because uptake occurs through the leaves from the sprays and through the roots from the soil dressings. For example, Secrett (1949) claimed that the beneficial results obtained by irrigating a cauliflower crop with water containing 1 part of KNO_3 in 20,000 was due to nutrient uptake by the leaves. In an experiment on irrigated sugar-beet in which 12 in. of irrigation water were applied during the season, the application of nitrogen in the water caused a greater increase in the yield of tops than the application of similar amounts of N to the soil at sowing (Rothamsted: Results of field experiments, 1949). However, in this experiment and in Secrett's irrigations the amount of water applied was so great that most of the contained nutrient must have fallen on to the soil instead of being retained by the leaves, and, therefore, the difference between solid- and spray-application of the fertilizer was probably not due to leaf absorption but to the sustained supply of nutrients throughout the season resulting from the latter treatment. In reviewing the literature on nutrient absorption by leaves of crops, it is important to distinguish between spray application of fertilizers mainly to the leaves and application mainly to the roots. In order that most of the nutrient spray shall be retained by the leaves, the volume applied must usually be not more than about 100 gal. per acre, especially with young crops of small leaf area, e.g., immature crops or those suffering from nutrient deficiencies. The quantity of fertilizer that can be applied is limited by the volume of spray, the solubility of the fertilizer and the danger of scorching the leaves. Thus, it is frequently necessary to spray a crop several times in order to apply a normal dressing of fertilizer. An alternative to frequent sprayings with a dilute solution is to apply a single low-volume spray (less than 40 gal. per acre) in the form of an almost saturated solution. With some crops and certain fertilizers the scorching of the leaves caused by such a treatment is slight, especially if the leaf area of the crop is large, so that only a small proportion of the total leaf surface is wetted. Even when most of the nutrient in a spray has been retained and absorbed by the leaves of a crop it cannot be said that the resultant effects are caused only by nutrients absorbed through leaves, unless they occur when nutrients are applied to the leaves but not when they are applied in similar quantities to the soil at the same time.

The most important recent developments in the application of fertilizers to the leaves of crops have been concerned with sprays supplying the major nutrients singly, or, more rarely, in combination with others, or with minor elements, insecticides, fungicides or herbicides.

NITROGEN

Nitrogen fertilizer was applied in leaf sprays as early as 1914 (Ballard and Volck, 1914 ; Lewis and Allen, 1914), and is today the nutrient most frequently applied by this method. Urea is the most usual form of nitrogen for sprays because of its great solubility, and its high nitrogen content which allows relatively large amounts of nitrogen to be supplied in dilute sprays. The risk of scorching with urea sprays is usually less than with sprays supplying equivalent quantities of nitrogen in other forms.

Vegetable and tomato crops frequently benefit from urea sprays (Mayberry and Wittwer, 1952). Montelaro *et al* (1952) showed that the yield of tomatoes grown in the field was increased equally by equivalent amounts of nitrogen applied in solid form to the soil or as urea sprays, and that leaf N was proportional to the amount of nitrogen applied, irrespective of the method.

Urea is used for fertilizing sugar-cane (Hawaiian Sugar Planters' Association, 1951). In one crop, 95% of the spray applied from an aeroplane was intercepted by the foliage. Spray application of urea gave higher nitrogen per cent of dry weight in the leaf than equivalent soil dressings of urea for at least one month after treatment, and the

difference persisted longer if the crop was very deficient in nitrogen. At 20 lb. N per acre, soil dressings of ammonium nitrate caused similar increases in yield of maize to 5% urea sprays (Foy *et al*, 1953), but at 40 lb. N per acre the soil dressing of N gave the larger yield. Urea sprays also caused the same increase in yield of orchard grass as ammonium nitrate side dressing (MacVicar and Gibson, 1951). Experiments at Jealott's Hill (1953) showed that the effects of urea sprays applied to winter wheat when the crop was 6 in. high did not differ significantly from those of solid urea applied to the soil at the same times. Spray- and solid-application of urea also had similar effects on Italian ryegrass and a grass/clover ley (Low and Armitage, 1954). The urea was applied as single sprays at 20 gal. of 11-14 % urea solutions per acre, supplying 10-40 lb. N per acre. At Rothamsted (Thorne and Watson, 1952 ; 1953), spraying winter wheat at ear emergence with 3% ammonium nitrate at 100 gal. per acre had the same effect on yield and on the nitrogen content of grain and straw, as supplying the same solution to the soil at the same time.

The nitrogen uptake of sugar-beet plants from 3% ammonium nitrate or an equivalent urea solution, applied in September as 6 sprays, each of 100 gal. per acre, was twice that obtained from similar solutions applied to the soil between rows. (Thorne and Watson 1952). Of the nitrogen applied in the leaf sprays, whether as ammonium nitrate or urea, 73% was recovered in the plant and 29% was converted to leaf protein. In another experiment, nitrogen uptake from four 3·4 % urea sprays, each applied at 100 gal. per acre, and from one spray of 54·7% urea at 25 gal. per acre, did not differ significantly, although the concentrated spray caused some leaf scorch. (Thorne and Watson, 1953.)

The effects of urea sprays have been studied in greater detail for fruit trees than for field crops, probably because in orchards the application of sprays is as convenient as the application of solid fertilizer, even when the urea is not added to the routine insecticidal and fungicidal sprays. Some of the results obtained from experiments with apple trees are of general interest. Fisher (1952) concluded from the results of several years' experiments that foliage sprays could give yields as large as, or larger than, equivalent soil dressings, and that leaf sprays may cause more rapid effects than soil dressings, but the former may be only temporary. Spray application of nitrogen to fruit trees allows a more accurate timing of the resultant effects than does soil application, and it also permits fertilization of the tree without interfering with the cover crop. Tolhurst and Bould (1952) have shown that nitrogen applied to apple trees as urea sprays does not kill the clover in the cover crop, as do soil dressings, and that trees grown in a non-leguminous sward benefit from urea sprays, whereas all the nitrogen in a soil dressing is utilized by the grass.

In field experiments, there can be no proof that the increase in nutrient content caused by applying fertilizers in spray form results from the absorption of nutrients through the leaves, but, in pot experiments, the roots can be protected and nutrients applied to the aerial parts of the plant only, so that leaf and root absorption can be clearly distinguished. Equivalent urea, calcium nitrate or ammonium sulphate leaf sprays increased the growth and leaf-nitrogen content of 1-year-old apple trees grown in the greenhouse to the same extent (Rodney, 1952). The increase in leaf nitrogen was the same for spray applied to the lower or the upper surface of the hypostomatous leaf, and was unaffected by a 40% reduction in light intensity during the absorption period. The leaves of sugar-beet, like those of apples, absorbed nitrogen equally readily from urea, calcium nitrate or ammonium sulphate solutions (Thorne, 1954a). Daily spraying with 2% ammonium nitrate increased the leaf area, dry weight and nitrogen content of tops and roots of sugar-beet plants grown at various fertilizer levels (Thorne, 1955). The percentage of the applied nitrogen absorbed was greater from sprays than from nitrogenous salts applied to the soil at sowing and was unaffected by fertilizers added to the soil, but those, including nitrogen, which brought about a greater leaf area also caused a greater total uptake from the spray. The increased growth caused by nitrogenous sprays was accompanied by a greater uptake by the roots of phosphorus and potassium, and, to a smaller extent, of nitrogen.

The factors affecting the absorption of urea by apple leaves have been studied by Cook and Boynton (1952). Uptake was determined by applying a known volume of 1% urea solution to several leaves, and, after various intervals, washing off and estimating the unabsorbed residue. In 2 hr. the lower surface of young apple leaves absorbed 60% of the applied urea, and the upper surface 13% ; after 24 hr. the figures were 80% and 20%, while a further slight absorption occurred during the next 10 days. Young leaves absorbed more than older ones. Absorption during 2 hr. was increased by high leaf-nitrogen content, unaffected by reducing the carbohydrate in the leaf by shading, and reduced by adding sucrose to the spray. Tobacco leaves treated with urea labelled with N^{15} absorbed 25% of the urea within 6 hr. and over 30% in 24 hr. (Volk and McAuliffe, 1954). Half the absorbed nitrogen was translocated to other parts of the plant 24 hr. after application. The urea concentration in apple leaves had increased markedly 8 hr. after the solution was applied, and subsequently declined, while amino-, amide- and protein-nitrogen

ncreased, and there was only a very small increase n free ammonia (Boynton *et al*, 1953). The hanges in the nitrogen fractions of the leaf follow- ng treatment with equivalent urea and ammonium ulphate solutions were similar. Hinsvark *et al* 1953) claim that, after absorption by the leaf, rea is immediately hydrolyzed by urease to mmonia and carbon dioxide. The radio-activity ue to production of radio-active CO_2 in a closed ystem, after treating leaves in the dark with urea abelled with C^{14}, increased for 8 or 9 hr. nd then remained constant. Production of radio- ctive CO_2 was more rapid from species that are more usceptible to scorching by urea and was reduced y adding sucrose to the urea solution. Although hese workers claim that scorching was associated ith rapid hydrolysis of urea, accumulation of mmonia has not been found associated with corching (Cook and Boynton, 1952 ; Foy *et al*, 953).

The factors controlling the phytotoxicity of rea sprays appear to be complex (Tolhurst and Bould, 1952). It is well established that sucrose educes damage from urea sprays, but it also educes nitrogen uptake (Emmert and Klinker, 950 ; Cook and Boynton, 1952 ; Eaton and Ergle, 1953 ; Foy *et al*, 1953). A number of other dditives has been tested, but only magnesium ulphate (Montelaro *et al*, 1952) and Bordeaux nixture (Mack and Shaulis, 1947) reduced the lamage. It is not known whether these sub- tances also reduced nitrogen uptake. Sandford *t al* (1954) were able to relate damage caused to ineapple leaves by a particular stock of urea to ts biuret content. Biuret alone, or mixed with rea, was highly toxic.

Phosphorus

Sprays should provide an economical method or supplying phosphorus, because they avoid loss y fixation in the soil, but phosphorus appears o be applied in sprays much less frequently than itrogen. This may be because agricultural crops equire phosphorus early in the season when there s only a small leaf-area to retain spray, and ecause many phosphorus compounds have a low olubility.

Silberstein and Wittwer (1951) report an xperiment in which 2·7 lb. P_2O_5 per acre applied n 4 sprays of orthophosphoric or glycero-phos- horic acid increased the early yield of tomatoes nore than did 135 lb. P_2O_5 per acre applied to the oil as superphosphate before transplanting. The prays were applied in June as the fruit was etting. The total yield, however, was increased ignificantly only by the soil treatment. Phos- horus-deficient tomatoes grown in pots increased n height, and maize and French beans increased in resh weight, after having their tops dipped in olutions containing 1·55 g. P per litre. The best results were obtained from orthophosphoric acid, potassium and ammonium phosphates. Magnesium phosphate and most organic phosphates had no effect. Phosphorus added to the soil had a greater effect on stem elongation of tomatoes than much smaller amounts applied in sprays, but increasing the latter by doubling the concentration of sprays did not cause a greater response. Working with sugar-beet and swedes, Thorne (1955) found that there was a greater recovery in the plant of phosphorus, as of nitrogen, from leaf sprays than from fertilizer added to the soil at sowing. The percentage of the phosphorus applied to the leaves that was absorbed was unaffected by phosphorus and potassium fertilizers added to the soil and was apparently slightly increased by nitrogen added to the soil. Phosphorus uptake by the leaves did not affect uptake through the roots, except when the phosphorus supply to the roots was very high ; root uptake of phosphorus was then reduced by spraying (Thorne, 1954b).

Although relatively little work has been done on the growth responses to phosphorus absorbed through the leaves, the physiology of uptake has been studied in considerable detail, presumably because uptake of phosphorus can be followed easily by using radio-active phosphorus (P^{32}) as a tracer. Autoradiographs of whole plants, made after treating single leaves with radio-active solutions, have shown that phosphorus is quickly absorbed and translocated to untreated parts of the plant ; 6 hr. after treatment, radio-activity was detected in untreated leaves of maize, tomato and beans, and after 24 hr. the roots were radio-active (Silberstein and Wittwer, 1951). In other experiments, P^{32} applied to the roots was detectable in the tops within 2 hr. and *vice versa* (Wittwer and Lundahl, 1951). During 24 hr., French bean plants absorbed more P^{32} from 0·5 micro-curies applied to the leaves than from 5 micro-curies applied to the soil. Lecat and Sosa-Bourdouil (1952) have also observed greater absorption by leaves from equal leaf and root applications of P^{32} ; 85% of the applied phosphorus was absorbed by the leaves in 28 days. Absorption of P^{32} by swede leaves increased for 2-3 days, and then remained constant at about 50% for another 5 or 10 days (Thorne, 1954b). Of the P^{32} applied to the 5th leaf of sugar-cane, 50% was absorbed in 15 days and 90% after 60 days (Hawaiian Sugar Planters' Association, 1951). Swanson and Whitney (1953) have studied the factors affecting the absorption and translocation of P^{32} from the leaf by measuring the activity in the petiole of French beans at the 3rd leaf stage 4 hr. after applying P^{32} to a primary leaf. Absorption decreased between pH 2·5 and pH 7·0, was decreased by a wetting agent more than could be accounted for by the change in pH, and was increased by abrasion of the leaf, and translocation was increased by raising the

petiole temperature from 5° to 30°C. Killing the phloem by steaming prevented the transport of phosphorus out of the leaf except that, when the leaf was partially wilted, transport apparently occurred through the xylem (Colwell, 1942). It is claimed that autoradiographs made 24 hr. after treating tomato leaves with active solutions show P^{32} in the cortex and epidermis, as well as in the vascular bundle of the petiole (Yatazawa and Ryuzo, 1954). Downward movement was mainly in the phloem, but, above the treated leaf, there was more P^{32} in the xylem than in the phloem. The same Japanese workers claim that P^{32} absorption by leaves of previously darkened wheat plants was increased by the addition to the phosphorus solution of sucrose and fructose, and, to a smaller extent, other sugars, and that 90% of the phosphorus absorbed through the leaves of *Brassica chinensis* was converted in 4 hr. to glucose-1-phosphate and fructose-6-phosphate (Yatazawa and Tai, 1953 ; Yatazawa and Higashino, 1953).

Potassium

Examples of application in sprays are even fewer for potassium than for phosphorus although the results that have been reported indicate that the method may be useful. The potash content of a crop of lucerne was increased by 35% by applying 65 lb. K_2O per acre in 4 potassium sulphate sprays, and equivalent soil dressings gave only one-third this increase (Thorne and Watson, 1953). The potash content of the crop was already high and neither leaf nor soil applications gave any increase in yield. Tropical crops might benefit from potash application in sprays because many tropical soils are low in potassium and do not respond well to soil dressings. The yield of sugar-cane and potassium content per cent of dry weight of the sheath were the same five months after receiving 19 lb. K_2O per acre as a spray as after 200 lb. K_2O applied to the soil (Hawaiian Sugar Planters' Association, 1951). A 28·5% solution of muriate of potash can be applied safely to sugar-cane as a spray from the air at 10 gal. per acre. Potassium was absorbed by sugar-beet from KCl sprays, which cured the potash-deficiency symptoms of marginal leaf scorch caused by a high nitrogen and phosphorus fertilizer added to the soil (Thorne, 1955). The percentage recovery of potassium in the plant was greater for leaf application than for soil application and potassium recovered from sprays appeared to be slightly increased by nitrogen added to the soil and reduced by potassium applied to the soil. This latter effect was probably due to reduced uptake by the roots of those plants well supplied with soil potassium when sprayed with potassium, seeing that there was no accumulation of unabsorbed potassium on the surface of the leaves.

Mixed Sprays

Sprays containing all three major nutrients N, P and K, are used occasionally. Several commercial mixed fertilizers of high solubility have been developed for application in solution to leaves or soil, and some have been used experimentally (Gillern, 1950 ; Arvan and Mowry, 1954 ; Pirone, 1952). The concentration of salts in a mixed spray is limited by their solubility and the danger of scorching, so that several applications may be required to supply the same quantity of one nutrient as can be applied alone in a single spraying or in a single soil dressing. A single spray, therefore, will have smaller effects than a soil dressing unless a given quantity of nutrient applied to leaves is as effective as ten times the quantity applied to the soil, as is claimed by Mednis (1952) in Russia. Other Russian workers (e.g. Matskov, 1949) have also reported experiments with NPK sprays, but neither the quantities of nutrients applied nor comparisons with soil applications are usually given by them.

Lewis (1936) sprayed lettuce plants, grown in pots of phosphorus-deficient soil, daily with a solution containing N, P and K. After five weeks the P-, but not the N- or K-, content was increased when spray had been applied to soil and leaves or to leaves only. Spraying the leaves of barley, Brussels sprouts, French beans, tomatoes and sugar-beet, daily for several weeks with a nutrient solution containing N, P and K increased the content of all 3 nutrients in the plants and increased the dry weight of plants of all the species (Thorne, 1954a). Experiments in which N, P and K were applied to leaves of sugar-beet separately and in all combinations showed that not all the increase in total content per plant of each of the constituents of a mixed spray was necessarily due to absorption from the spray (Thorne, 1955). Absorption of any of the nutrients tested was unaffected by the presence of others in the spray, but spraying with nitrogen-containing solutions increased the absorption of P and K by the roots from the soil, and K in sprays increased the uptake of P by the roots.

Mixing one or more major nutrients with herbicidal, fungicidal or insecticidal sprays frequently offers a convenient method of applying the fertilizer, but, as when mixing nutrients, there is the danger that the resultant spray will be more phytotoxic than any of the constituents applied alone. A 51% solution of ammonium nitrate or a 40% solution of urea was applied safely in April to winter wheat either alone or mixed with 2,4-D (Thorne, 1954b). Isaacs and Hester (1954) found that various insecticides and fungicides could be mixed with urea for application to vegetable crops but that ammonium nitrate was not safe with arsenicals unless lime was also added, possibly because ammonium nitrate increased, and lime

decreased, the solubility of the arsenates. Lime also reduced the injury to apple foliage caused by spraying with sodium or potassium nitrate or ammonium sulphate mixed with wettable sulphur and lead arsenate (Hamilton *et al*, 1943). Urea caused less damage than other forms of nitrogen when mixed with insecticides.

Micronutrients

Trace elements can be mixed with major nutrients in sprays or applied alone, and the small quantities required can be easily supplied in a single dilute spray. Trace-element deficiencies are frequently due to soil conditions making the element unavailable to the plant and are, therefore, often cured more easily by sprays than by soil application. For example, deficiencies of manganese in beetroot (Wallace and Ogilvie, 1941) and peas (Lewis, 1939) and boron in turnips (MacLachlan, 1944) were cured more readily by sprays than by soil dressings.

Conclusions

Although in some field experiments it is doubtful whether nutrients applied in sprays were absorbed by leaves or roots, pot experiments, in which spray was prevented from reaching the roots, have shown conclusively that nitrogen, phosphorus and potassium as well as micronutrients, fungicides, weedkillers, etc. can be absorbed by leaves. Most of the nutrient retained by the leaves is absorbed, often within a few days, and once inside the plants is distributed in a similar manner, and has similar effects on growth, to nutrient absorbed by the roots.

The mechanism of leaf absorption is not completely understood. Various workers have claimed that mineral nutrients (Shetlik and Trnkova, 1954; Rodney, 1952) and sucrose (Went and Carter, 1948) are absorbed through the cuticle and not through the stomata, and, on theoretical grounds, Fogg (1947) considers the passage of liquid into stomata unlikely. According to Boynton (1954), uptake probably occurs through both cuticle and stomata. Roberts *et al* (1948) have shown that there are discontinuities in the cutin covering the surface of McIntosh apple leaves, and that there is a continuous path of hydrophilic pectic substance from the leaf surface to the vascular bundle sheaths. However, absorption continues long after the leaf is apparently dry and spraying with water after a sodium phosphate spray had dried did not increase phosphorus uptake (Thorne, 1954b). The evidence shows that mineral nutrients can be absorbed by leaves directly through the cuticle but they may also be absorbed through the stomata.

In field experiments, the effects of nutrient sprays are usually about the same as for soil dressings, and rarely more than two or three times greater. Therefore, spray application does not result in a great saving of fertilizer but may be preferable to soil application when : (1) soil conditions or a competitive crop make nutrients from soil dressings unavailable ; (2) an accurately timed response to fertilizer is required, e.g. change in composition of a crop late in the season ; (3) routine applications are made of insecticidal or herbicidal sprays to which nutrients can be added ; (4) the growth of the crop prevents the application of fertilizer to the soil, but permits its application to the leaves from a high-clearance sprayer or from a helicopter. Apart from these practical considerations, nutrient absorption through leaves may prove very useful in theoretical studies on plant nutrition.

References

Arvan, P. G. and Mowry, D. T. 1954. High analysis water soluble plant food formulations. *Agric. Chem.* **9,** No. 3, 47–9.

Ballard, W. S. and Volck, W. H. 1914. Winter sprayings with solutions of nitrate of soda. *J. agric. Res.* **1,** 437–44.

Boynton, D. 1954. Nutrition by foliar application. *Annu. Rev. Pl. Physiol.* **4,** 31–54.

———, Margolis, D. and Gross, C. R. 1953. Exploratory studies on nitrogen metabolism by McIntosh apple leaves sprayed with urea. *Proc. Amer. Soc. hort. Sci.* **62,** 135–46.

Colwell, R. N. 1942. The use of radioactive phosphorus in translocation studies. *Amer. J. Bot.* **29,** 798–807.

Cook, J. A. and Boynton, D. 1952. Some factors affecting the absorption of urea by McIntosh apple leaves. *Proc. Amer. Soc. hort. Sci.* **59,** 82–90.

Eaton, F. M. and Ergle, D. R. 1953. The relationship of seasonal trends in carbohydrate and nitrogen levels and effects of girdling and spraying with sucrose and urea on the nutritional interpretation of boll shedding in cotton. *Pl. Physiol.* **28,** 503–20.

Emmert, E. M. and Klinker, J. E. 1950. Spraying tomato foliage with sucrose to increase carbohydrates and protect against injury by urea sprays. *Bull. Ky agric. Exp. Sta.* No. 550.

Fisher, E. G. 1952. The principles underlying foliage application of urea for nitrogen fertilization of the McIntosh apple. *Proc. Amer. Soc. hort. Sci.* **59,** 91–8.

Fogg, G. E. 1947. Quantitative studies on the wetting of leaves by water. *Proc. roy. Soc. Sect. B.* **134,** 503–22.

Foy, C. D., Montenegro, G. and Barker, S. A. 1953. Foliar feeding of corn with urea nitrogen. *Proc. Soil Sci. Soc. Amer.* **17,** 387–90.

Gillern, C. 1950. Untersuchungen über die Wirkung des Laubdüngemittels "Assimilan" auf das Pflanzenwachstum. [Investigation into the effect on plant growth of foliar manuring with "Assimilan."] *Bodenkultur* **4,** 233–8.

Hamilton, J. M., Palmiter, D. H. and Anderson, L. C. 1943. Preliminary tests with uramon in foliage sprays as a means of regulating the nitrogen supply of apple trees. *Proc. Amer. Soc. hort. Sci.* **42,** 123–6.

HAWAIIAN SUGAR PLANTERS' ASSOCIATION. 1951. Cultural practices. *Rep. Hawaii Sug. Pl. Ass. Exp. Sta. Ctee* 8–14.

HINSVARK, O. N., WITTWER, S. H. and TUKEY, H. B. 1953. The metabolism of foliar applied urea. I. Relative rates of $^{14}CO_2$ production by certain vegetable plants treated with labelled urea. *Pl. Physiol.* **28,** 70–6.

ISAACS, R. L. and HESTER, J. B. 1953. Plant nutrients, foliar application to vegetable crops. *J. agric. fd Chem.* **1,** 239–40.

JEALOTT'S HILL RESEARCH STATION. 1953. Guide to field experiments. 50–2.

LECAT, P. and SOSA-BOURDOUIL, C. 1952. Mesure de l'absorption foliare par l'emploi du phosphor radioactif, P^{32}. [Measurement of foliar absorption using radio-active phosphorus.] *C.R. Acad. Agric. Fr.* **38,** 665–7.

LEWIS, A. H. 1939. Manganese deficiencies in crops. I. Spraying pea crops with solutions of manganese salts to eliminate marsh spot. *Emp. J. exp. Agric.* **7,** 150-4.

LEWIS, C. I. and ALLEN, R. W. 1914. The influence of nitrogen upon the vigor and production of devitalised apple trees. *Rep. Oreg. agric. Exp. Sta. Hood River Branch Exp. Sta.* 5–19.

LEWIS, D. 1936. A note on the absorption of solutes by leaves. *J. Pomol.* **14,** 391.

LOW, A. J. and ARMITAGE, E. R. 1954. Foliar application of nitrogen on grassland. *Agriculture, Lond.* **61,** 368–73.

MACK, G. L. and SHAULIS, N. J. 1947. Nutritional sprays on grapes. *Phytopathology* **37,** 14.

MACLACHLAN, J. D. 1944. Control of water core of turnips by spraying with borax. *Sci. Agric.* **24,** 327–31.

MACVICAR, R. M. and GIBSON, D. R. 1951. A preliminary investigation of orchard grass seed production as influenced by nitrogen applied as a spray. *Sci. Agric.* **31,** 396–8.

MATSKOV, F. F. 1949. [Extra-radical nutrition of plants.] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) **66,** 733–6.

MAYBERRY, B. D. and WITTWER, S.H. 1952. Urea nitrogen applied to the leaves of certain vegetable crops. *Bull. Mich. agric. Exp. Sta.* **34,** 365-9. [Cited in *Biol. Abstr.* **27,** 26061.]

MEDNIS, Y. A. 1952. [Top-dressing of plants other than through the roots.] [Russian] *Sovet. Agron.* (*Soviet Agron.*) No. 7. 53–61. [Cited in *Soils and Ferts* **16,** 247.]

MONTELARO, J., HALL, C. B. and JAMISON, F. S. 1952. Studies on the nitrogen nutrition of tomatoes with foliar sprays. *Proc. Amer. Soc. hort. Sci.* **59,** 361–6.

PIRONE, P. P. 1952. Feeding plants through the leaves. *Gdn J. N. Y. Bot. Gdn* **2,** 45–60. [Cited in *Hort. Abstr.* **23,** 1482.]

ROBERTS, E. A., SOUTHWICK, M. D. and PALMITER, D. H. 1948. A microchemical examination of McIntosh apple leaves showing relationship of cell wall constitutents to penetration of spray solutions *Pl. Physiol.* **23,** 557–9.

RODNEY, D. R. 1952. The entrance of nitrogen compounds through the epidermis of apple leaves. *Proc. Amer. Soc. hort. Sci.* **59,** 99–102.

ROTHAMSTED EXPERIMENTAL STATION. 1949. Results of field experiments.

SANFORD, W. G., GOWING, D. P., YOUNG, H. Y. and LEEPER, R. W. 1954. Toxicity to pineapple plants of biuret found in urea fertilizers from different sources. *Science* **120,** 349-50.

SECRETT, F. A. 1949. The use and abuse of artificial irrigation on horticultural crops. *J. roy. hort Soc.* **74,** 282–8.

SHETLIK, I. and TRNKOVA, A. 1954. A study with the help of radio-active isotopes of the penetration of spray solutions into the leaves of higher plant. *Chekhoslov. Biol.* **3,** 237–9.

SILBERSTEIN, O. and WITTWER, S. H. 1951. Foliar application of phosphatic nutrients to vegetable crops. *Proc. Amer. Soc. hort. Sci.* **58,** 179–90.

SWANSON, C. H. and WHITNEY, J. B. Jr. 1953. Studies on the translocation of foliar applied P^{32} and other radio-isotopes in bean plants. *Amer. J. Bot.* **40,** 816–23.

THORNE, G. N. 1954a. Absorption of nitrogen, phosphorus and potassium from nutrient sprays by leaves. *J. exp. Bot.* **5,** 37–48.

———— 1954b. Nutrient uptake from leaf sprays. *Rep. Rothamsted Exp. Sta.* 188–94.

———— 1955. Interactions of nitrogen, phosphorus and potassium supplied in leaf sprays or in fertilizer added to the soil *J. exp. Bot.* **65** 20–42.

———— and WATSON, D. J. 1952. Uptake of nutrients from solution sprayed on leaves. *Rep. Rothamsted Exp. Sta.* 66–7.

———————— 1953. Nutrient uptake from leaf sprays. *Rep. Rothamsted Exp. Sta.* 69–71.

TOLHURST, J. A. H. and BOULD, C. 1952. Nutrient placement in relation to fruit tree nutrition. IV. Experiments with urea sprays on foliage. 1952. *Rep. agric. hort. Res. Sta. Long Ashton.* 55–62.

VOLCK, R. and MCAULIFFE, C. 1954. Factors affecting the foliar absorption of nitrogen^{15} labelled urea by tobacco. *Proc. Soil Sci. Soc. Amer.* **18,** 308–12.

WALLACE, T. and OGILVIE, L. 1941. Manganese deficiency of agricultural and horticultural crops. Summary of investigations, Season 1941. *Rep. agric. hort. Res. Sta. Long Ashton* 45–8.

WENT, F. W. and CARTER, M. 1948. Growth response of tomato plants to applied sucrose. *Amer. J. Bot.* **35,** 95–106.

WITTWER, S. H. and LUNDAHL, W. S. 1951. Autoradiography as an aid in determining the gross absorption and utilization of foliar applied nutrients. *Pl. Physiol.* **26,** 792-7.

YATAZAWA, M. and TAI, K. 1953. Mechanism of foliar absorption of phosphate. I. The effect of accompanied sugars on absorption of phosphate. *J. Sci. Soil, Tokyo* **24,** 93-5.

———— and HIGASHINO, S. 1953. Mechanism of foliar absorption of phosphate. II. Forms of transferring phosphate after the foliar absorption. *J. Sci. Soil, Tokyo* **24,** 193-6. [Cited in *Chem. Abstr.* **48,** 4057.]

———— and RYUZO, I. 1954. Mechanism of foliar absorption of phosphate. III. Radio-autographs showing the path of movement of foliar absorbed phosphate. *J. Sci. Soil, Tokyo* **25,** 1-3. [Cited in *Chem. Abstr.* **48,** 11557.]

(*Received for publication 14th February, 1955.*)

FIELD CROPS

CEREALS

WHEAT

53 MAREE, H. J. **Wheat production in the summer-rainfall region [of South Africa].** *Fmg in S. Afr.* 1955, **30,** No. 374, 59-62, illus. [Coll. Agric. Potchefstroom]

The cultivation of wheat by the dry-land system and under irrigation is described and information given on methods of moisture conservation, suitable varieties of wheat and dates of planting. Mention is also made of the "saaidam" system in which land is flooded with water until the soil is saturated, subsequent cultivation being similar to that of the dry-land system.—M.P.

54 MILLER, Jean G. **A survey of factors affecting wheat yields in some parts of Canterbury.** *N.Z. J. Sci. Technol. Sect. A* 1954, **36,** No. 4, 401-15, bibl. 2, illus. [Dep. Agric. Wellington]

From a sample survey in an area near Christchurch for 1945 to 1950 it was shown that in wheat crops the standard fertilizer was 1 cwt. per acre of superphosphate, Cross 7 was the variety grown in 67% of the fields, certified seed was used in one-third of the crops, and there were many different rotations. Significantly better yields were obtained from wheat after grass [botanical composition not mentioned], or from wheat as the second crop after grass, than from wheat after two or more other crops. In a similar survey in Ashburton County from 1947 to 1952, soil type was shown to be the factor exerting the greatest influence on yield, with smaller differences between spring and autumn sowing, and between rotation histories. Best yields were obtained after peas, irrespective of whether that crop followed pasture or another crop. Details of the assumptions made and methods of calculating the estimates of the yield effects are given.—Author's summary.

55 FEUERLEIN, W. Weizen-Auswinterung. [**Winter-killing of wheat.**] *Dtsch. landw. Pr.* 1954, **77,** No. 13, 182-3, illus. [Inst. Bodenbearbeitung, Völkenrode-Ulm, W. Germany]

Many stands of winter-wheat failed to survive the extreme cold of the winter of 1953-4 in Germany. The main cause of failure was the freezing of the plants at the seedling stage. Since some, even neighbouring, stands withstood the winter better than others, an examination was made of those factors associated with successful overwintering in the region round Ulm. The varieties Carstens VI, Kriewener 192, Breustedts Werla and Heines VII were winter-hardy ; Graf Törring was not. Early sowing (before 15 Oct.), deep planting (4 cm. rather than 2 cm.), N manuring in spring rather than in autumn, and surface cultivation rather than deep ploughing increased the winter-hardiness of a stand. Maize was a suitable preceding crop ; legumes were not.—D.B.

756 THOMPSON, E. G. **Spring wheat.** *Agriculture, Lond.* 1955, **61,** No. 10, 478-81, bibl. 1. [Nat. Inst. Agric. Bot., Cambridge]

The factors which should influence a farmer's decision to sow winter or spring wheat, when the weather permits a free choice, are discussed. Winter wheat appears to yield better than spring wheat on normal soils in the traditional wheat-growing areas, especially in hot, dry seasons. In the parts of Britain where winters are extremely wet, winter wheat does not thrive. Owing to the lack of a completely stiff-strawed winter wheat, spring wheat is less likely to lodge on extremely fertile soils than winter wheat. Spring sowing tends to reduce infection by eyespot [*Cercosporella herpotrichoides*] and take-all [*Ophiobolus graminis*] and to reduce infestation with wild onion and wild oats. Owing to its tendency to ripen after other cereals, spring wheat can be used to lengthen the period in which combine-harvesters can work. The high quality of the flour from the varieties Atle and Atson is another factor favouring the use of spring wheat. In most areas spring wheat should be sown in February, or, if that is not possible, in March. The characteristics of the varieties Atson and Fylgia are described. Atson has outyielded Atle in trials ; its resistance to yellow rust [*Puccinia glumarum*] is almost as good as that of Atle and its resistance to loose smut is similar. Fylgia ripens a week or more earlier than Atle but frequently gives a 10-15% lower yield. Preliminary trials suggest that Fylgia II gives higher yields than Fylgia but matures slightly later. The German variety Peko is also undergoing trials. It appears to give a grain yield comparable with that of Atson ; its flour is more suitable for biscuit-making than for bread. A list is given of the latest safe sowing dates for 28 commonly-sown varieties, including both spring and winter wheats.—W.J.B.

757 MORRIS, G. P. **Descriptions of wheat, barley and oat varieties.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 33-43, bibl. 5, illus.

Descriptions are given of 3 varieties of wheat : Masterpiece, Minister and Atson ; 3 varieties of barley : Carlsberg, Herta and Rika and 1 variety of oats : Opus.—C.L.S.

758 RODGER, J. B. A. and THOMPSON, E. G. **Winter wheat variety trials, 1942-1947.**

J. nat. Inst. agric. Bot. 1954, **7,** No. 1, 44-51, bibl. 1.

Data are given on the following varieties : Bersee, Cote d'or, Defiant, Desprez 80, Guardsman, Jubilegem, Juliana, Vilmorin 27 and Wilma.—C.L.S.

759 FIDDIAN, W. E. H. **Winter wheat variety trials (Bersee control) 1947-51.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 52-63, bibl. 1.

The results from 52 trials of 11 early-maturing varieties of winter wheat, using Bersee as the control, are reported. Nord Desprez, Petit Quin Quin and Hybrid 46 were shorter in the straw, more resistant to lodging and gave higher yields than Bersee.—From author's summary.

760 THOMPSON, E. G. **Winter wheat variety trials (Juliana control) 1946-51.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 64-73, bibl. 3.

A report is given of some 57 trials carried out [in Britain] between 1946 and 1951 of eleven late maturing winter-wheat varieties, against Juliana as control.—Author's summary.

761 FAJERSSON, F. Weibulls Original Svennovårvete. [**Weibull's Original Svenno spring wheat.**] *Agri hort. genet.* 1955, **13,** No. 1-2, 1-18, bibl. 3, English and German summaries pp. 16-18.

Svenno spring wheat (originally designated W. 4808) was released in Sweden in 1954 and is a sister line to Kärn II. Data are given of the results of trials in Sweden to compare the different agronomic characters of Svenno with those of a number of other spring wheats. In trials at Weibullsholm during 1946-54 in good conditions for growing spring wheat, Svenno was outyielded by Atle, Atson, Ella, Kärn II and Pondus (the latter by 6·1%) and outyielded Diamant II by 9·1% and Rival by 6·4%. In regional trials in the Weibullsholm district during 1947-53, Svenno outyielded Diamant II, Ella, Kärn II and Pondus by 5·8, 5·6, 0·7 and 2·7%, respectively. In all official trials in which Svenno has been included during 1947-53, this variety outyielded Diamant II, Drott, Ella, Fylgia II, Kärn II, Pondus and Rival by 7·2, 2·3, 9, 2·9, 2, 1·1 and 6·9%, respectively. Svenno was considerably more stiff-strawed than older varieties, with the exception of Progress, compared with which it was very similar. Svenno has somewhat shorter straw than other varieties in current use ; in 36 trials, the average straw lengths of Kärn II and Svenno were 109 and 101 cm., respectively. In trials at Weibullsholm, Svenno matured earlier than all other varieties with which it was compared, the average differences ranging from 4·3 days for Atle, to 0·3 days for Rival. In official trials, Svenno averaged 1·2 days later than Diamant II and 0·2 days later than Rival in maturing, but was earlier than all other varieties, particularly Ella and Pondus. Svenno has a high hectolitre weight. T crude protein content of the grain of Svenno higher than that of Kärn II, but the differen are not significant. On optimum bromide additi the specific bread volume of Svenno was lower th that of Kärn II by up to 2·9%, but higher th that of all other varieties tested. The specific dou weight of Svenno averaged one unit higher th that of Kärn II. Svenno is resistant to *Erysip graminis.* Kärn II appears to be relatively m resistant to *Puccinia triticina.*—P.J.B.

762 FAJERSSON, F. Några nya rön om Sve novårvete. [**New experiences with Sven spring wheat.**] *Weibull's ill. Årsb.* 1955, Spring, 26-7.

Data are given comparing the incidence of lo ing of Svenno with other varieties in offic trials in Sweden. On a scale 0-10, in which 10 complete lodging, values for Svenno ranged fr 1-1·3, compared with 1·8 for Drott, 1·9 for El 2·2 for Pondus, 2·3 for Kärn II, 2·5 for Rival, for Fylgia II and 4 for Diamant II. In trials ove 6-year period at Weibullsholm, lodging incide in Svenno and Progress, an extremely stiff-straw but late-maturing variety, has been very simil The time of maturation for Svenno, Drott, Fylg II and Rival has not differed more than half-a-da Ella and Pondus have matured later than Sven by about 4 and 3·5 days, respectively. Notes a also given on disease resistance in Svenno.—P.J.

763 FAJERSSON, F. Aktuella vårvetesorter. [**Cu rent spring wheat varieties.**] *Weibull's Årsb.* 1954, **49,** Spring, 11-16, illus.

Observations are made on the characteristics a adaptation of the spring wheat varieties Kärn Pondus and Svenno in Sweden. Kärn II has giv good yields when grown in southern Skåne, up the Bergslagen district. It has replaced Diama II in certain districts, despite its tendency mature later than that variety. Pondus matu 2-3 days later than Kärn II and appears to ha slightly stiffer straw. Pondus has done very w in dry seasons and in dry areas, compared wi Kärn II, but has done relatively less well und damp conditions, in which Kärn II is superior Pondus, owing to better resistance to mild [*Erysiphe* sp.]. Pondus is considered to be suit to fertile soils in south and central Sweden, but n to be suitable for growing where liable to mild attack. Svenno, a new variety, is considera more stiff-strawed and matures about 2 da earlier than Kärn II. In comparative trials at large number of locations during the period 194 50, Svenno outyielded Kärn II by 4·1% ; at o 3 out of 22 locations did Kärn II outyield Sven Pondus, under conditions which favour it, is al to outyield Svenno, but is inferior to resistance mildew. It is considered that Svenno should larg

place Diamant II and should replace Kärn II in south Swedish uplands and in north Sweden, the grounds of its earlier maturity.—P.J.B.

4 FAJERSSON, F. Bancovetets övervintring i Skåne och Östergötland vintern 1953-54. [**The overwintering of Banco wheat in Skåne and Östergötland in the winter of 1953-54.**] *Weibull's Årsb.* 1954, Autumn, 1-7.

view of conflicting reports of the winter-rdiness of Banco wheat, especially after the ry severe winter of 1946-7, trials were made to mpare the overwintering capacities of Banco, oica, Skandia III B and Eroica II in Skåne and tergötland in the winter of 1953-4 at a number of ferent locations in each province. In 20 trials in åne, stands, as measured in April on a scale 0, in which 10 = full stand, were 5·9, 7·0, 7·0, and for the above varieties, respectively. In one-rd of the trials, Banco overwintered as well as other varieties ; in over one-third of the trials, nds of Banco were so reduced as to have been ely to reduce subsequent grain yields, compared th the other varieties. Differences in the respec-e capacities of Banco and Eroica to overwinter re not apparently due to differences in mildew *rysiphe* sp.] attack ; Banco appears to be more sceptible to snow mould [*Typhula* sp.] than oica and to be less resistant to strong winds and ld. The French variety Nord Desprez was in-ded in 13 trials and was given a value of 2·8 on e scale. This variety has been able to over-nter satisfactorily in Skåne in previous years, t is not regarded as of use in Sweden, owing to low protein content and low hectolitre weight. the Östergötland trials, mean values for Eroica, andia III B, Eroica and Banco in 9 trials were 3, 7·7, 7·6 and 7·5. It was concluded that in uth Swedish conditions, Banco has a relatively od degree of cold resistance.—P.J.B.

5 MAES, E. and PEETERS, G. La valeur boulangère des races sélectionées de froment belge—Récolte 1953. Comparaison avec les races cultivées au Grand-Duché de Luxembourg. [**The baking quality of selected strains of Belgian wheat—1953 harvest. Comparisons with strains cultivated in the Grand Duchy of Luxembourg.**] *Rev. Agric., Brux.* 1954, **7,** No. 12, 1423-39, bibl. 2, illus. [Lab. Cent., Minist. Affaires Écon., Belgium]

rieties produced by research stations were ssified according to baking quality as follows. ry good: Capelle, Lille, Desprez, Alba and lgia ; good: Leda, Molinel and Ministre ; poor: r. Journée, Prima, Heine VII and Jubilé.—D.B.

6 TRENTIN, A. Risultanze della sperimentazione sul grano condotta dall'Istituto di Genetica di Lonigo nell'annata 1953-54. [**Results of wheat trials conducted by the Institute of Genetics, Lonigo, in the year 1953-54.**] *Agricoltura d. Venezie* 1955, **9,** No. 1, 15-23, illus. [Ist. Gen. Sper. Agr. N. Strampelli, Lonigo, Italy]

Yields and performance grading of 20 old varieties of wheat are tabulated for different localities. Funo and S. Pastore maintained their superiority over other varieties, though particular regions favoured individual varieties. Fifteen new varieties of wheat were on trial in their areas of origin with the most widely grown old varieties Funo, Jacometti 49, Impeto, Mara and S. Pastore as controls. Generoso, Bormida and Fraschetta hold promise, but the control varieties were superior and continue to justify their widespread cultivation.—M.P.

767 K.I.O. FORTNIGHTLY. **Release of a new wheat.** *K.I.O. Fortnightly* 1954, No. 285, 2.

A new wheat variety, 261.E, has been released and is described, but no certified seed is available. It has done well in the Nakuru and Solai Valley areas and should be suited to all areas in Kenya from 6000-7000 ft. where the growing season lasts 4·5-5 months.—M.P.

768 THORPE, H. C. **Release of new cereal varieties. 5.** *E. Afr. agric. J.* 1954, **20,** No. 2, 133-4, bibl. 1. [Dep. Agric. Kenya]

Brief descriptions are given of 5 cereal varieties released for Kenya. The wheats D.C. × Ceres R. 64 and Carleton C.I. 12064 were released in 1953-4. Wheat No. 351 A.S. I.B.2. and the barley varieties Abed Kenia and Herta were released in 1954-5. Suitable distributions are considered, mainly in respect to altitude.—M.P.

769 THORPE, H. C. **Cereals in Kenya : 1955-56.** *K.I.O. Fortnightly* 1955, No. 290, 3-6.

Notes are given of the wheat, barley and oat varieties most commonly grown in Kenya, and recommendations are made for their cultivation at different altitudes. The seedling reactions to some of the stem rust forms are tabulated for 22 wheat varieties. Details are also given of the new wheat varieties 354P.3.B.2.B and 356A.12C ; and Vikota oat (an importation from the USA) released from departmental control.—M.P.

770 HARRIS, R. H. and others. **Milling and macaroni-making quality of some new durum wheat hybrids.** *Bimon. Bull. N. Dak. agric. Exp. Sta.* 1955, **17,** No. 3, 95-100.

Varieties considered include : Mindum, Stewart 221, Vernum, Sentry and 5 hybrids which have not yet been released.—P.J.B.

771 HARRIS, R. H. and others. **Quality of some**

new rust resistant bread wheat hybrids. *Bimon. Bull. N. Dak. agric. Exp. Sta.* 1955, **17,** No. 4, 131-7, illus.

Data are given of the baking quality of the varieties Rushmore, Thatcher, Lee and Selkirk.—P.J.B.

772 HOROVITZ, N. Nueva variedad en trigo para la provincia de Entre Ríos. [**New variety of wheat for the Province of Entre Ríos.**] *Idia* 1954, **78,** 7-8.

A new variety of wheat, Magnif Entreriano M.A.G., suitable for use in the Province of Entre Ríos, Argentina, is described. The grain is " semi-hard " and resembles that of the variety 38 M.A. In the 4 years 1949-52, the new variety outyielded Klein Cometa by more than 50%. Magnif Entreriano is a very early variety, short-strawed, resistant to lodging and to *Puccinia glumarum* and *P. graminis.* It is semi-resistant to *P. triticina.* It should be sown in Entre Ríos in June or July at a rate of about 60 kg. per ha.—W.J.B.

773 WELLINGTON, P. S. **A method for assessing premature germination in the ear in wheat.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 74-9, bibl. 8.

Methods used for comparing premature germination of different wheat varieties are discussed, as well as the conditions which have to be fulfilled by a standard method. Experiments are described in which ears of a red and a white wheat variety, with the same date of anthesis, were soaked for various periods followed by incubation in a saturated atmosphere under conditions which permitted free drainage of any surplus water. Germination was more rapid when the ears were soaked for 4, 8 or 12 hr. than for 1 hr. and 24 hr. After soaking for 8 hr. there was a significant increase in the number of germinated grains at drainage periods greater than 16 hr. for the white wheat and 64 hr. for the red. The presence of the chaff during the drainage period was necessary for rapid germination, but no evidence was obtained that a substance capable of inhibiting germination was removed during the soaking period. It is suggested that the rate at which water evaporates from the chaff after heavy rain is likely to be a factor determining premature germination under field conditions.—Author's summary.

774 OVERLAND, A. and NELSON, W. L. **Germination tests with commercial lots of wheat seed treated with copper carbonate.** *Pl Dis. Reptr* 1954, **38,** No. 1, 25-6. [Washington Agric. Exp. Sta., Pullman]

In laboratory trials, the germination of wheat seed was reduced considerably by seed treatment with copper carbonate slurry, particularly where the treated seed was exposed to temperatures of 3°C. for up to 19 days. Seed treatment with copper carbonate dust had little effect on germination.—P.J.B.

775 PRAMER, D. and WRIGHT, Joyce, M. **Some phytotoxic effects of five actinomycete antibiotics.** *Pl. Dis. Reptr* 1955, **39,** No. 2, 118-19, bibl. 14. [New Jersey Agric. Exp. Sta., New Brunswick]

Data are given of the toxicity, in terms of root growth as a percentage of controls, of 100 and 500 ppm. solutions of neomycin, streptomycin, oxytetracycline (terramycin), chlortetracyclin and chloramphenicol, in which the seed of mustard, red clover, cucumber and wheat was germinated. No antibiotic affected germination, but all affected root growth. Wheat was least affected by the treatments and neomycin and streptomycin caused the least inhibition of root growth. Root growth of wheat seed treated with 500 ppm. neomycin and streptomycin was 57 and 53% of controls ; where 100 ppm. solutions were used root growth was 63 and 46% of controls, respectively.—P.J.B.

776 MICHAJLIKOV, V. and others. El temple del trigo contra la sequía aplicado al gran cultivo. [**The effect of moistening and drying of seeds on the drought-resistance of wheat grown on a field scale.**] *Meteoros* 1954, 4, No. 3, 215-29, illus.

Wheat was grown on 6 farms in 1953 from seed first moistened and then dried using Henkel's method [see *Fld Crop Abstr.* 7 : 18]. The total area devoted to the trials was 40 ha. The seeds were kept moist at a temperature of 18°C. for 24 hr. and dried at 25°C. Owing to wind erosion and insect attack reliable results were obtained on one farm only. In this experiment wheat plants from treated seed were better developed above and below ground than plants from the untreated seed and yielded 30% more grain than the latter. In 1953 cereal crops did not suffer from the drought more than is usual for the region.—W.J.B.

777 HELMERICK, R. H. and PFEIFER, R. I. **Differential varietal responses of winter wheat germination and early growth to controlled limited moisture conditions.** *Agron. J.* 1954, **46,** No. 12, 560-2, bibl. 3, illus. [Wyoming Agric. Exp. Sta., Laramie]

The trials reported were carried out with the object of determining the respective ability of different winter wheat varieties to germinate in conditions of limited moisture. It was thought that the results might provide a basis for the production of varieties which have a superior ability to produce vigorous stands under soil moisture levels which, in the Western States, are frequently insufficient to ensure good stands where existing

varieties are used. In laboratory experiments, Yogo and Cheyenne winter wheats were germinated in solutions with osmotic pressures ranging from 6·5 to 11·5 atmospheres, with intervals of 0·5 atm. The average growth score of Yogo at all osmotic pressures was significantly (1% level) better than that of Cheyenne. In field trials, stand counts of 12 winter-wheat varieties grown at 3 locations in Wyoming were taken before the first killing frost in 1953. At the 3 locations, percentage emergence ranged from 72·5 and 69·2 for Kharkof MC. 22 and Yogo, respectively, to 43·3 for Cheyenne. In these trials, as in those in the laboratory, emergence of Yogo was significantly better than that of Cheyenne at all locations. Both these varieties are recommended for Wyoming conditions. These differences between Yogo and Cheyenne in respect of their respective ability to produce stands were further confirmed by germinating these two varieties in soil cultures under conditions of limited moisture.—P.J.B.

778 PFEIFFER, R. and others. **The use of dinitro weedkillers on winter cereals.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 12, bibl. 2. [Pest Control Ltd., Chesterford Res. Sta., England]

Spraying winter wheat with DNC at rates of 4-6 lb. acid equivalent per ac. during the period Dec., 1953 to Feb., 1954, gave good control of most autumn-germinating annual weeds. In 6 trials, both winter and spring treatments with equivalent rates of DNC resulted in similar and significant grain-yield increases. Severe frosts within 10 days of treatment with DNC resulted in severe scorch but such scorch (up to 60% of emerged wheat leaves affected) did not result in measurable yield decreases, except in one case. The yield increases following DNC treatment were ascribed to control of weeds and not to a specific effect of DNC. Additional spring treatments with 4-6 lb. DNC per ac. in spring, after similar winter treatments, did not result in further yield increases over winter treatments alone. DNOSBP (triethanolamine) was less selective than DNC as indicated by scorch caused to wheat, but was safe to spray on winter wheat at rates of about 0·75 lb. a.e. per ac. The yield increases following such treatments did not differ significantly from those where 4-6 lb. DNC per ac. were used.—From authors' summary.

779 ROW, V. V. **The effect of spraying MCPA (sodium 2 methyl 4 chlorophenoxyacetic acid) to suppress *Cyperus rotundus* Linn. on the yield of wheat crop grown in an infested field.** *Proc. Indian Acad. Sci.* 41B, No. 2, 65-8, bibl. 4. [Bot. Sect., Coll. Agric. Poona, India]

The wheat variety Niphad-4 was sown in a replicated trial at a spacing of 12 in. between rows and 3 in. between plants. The treatments included in the trial were (a) plots with and without *Cyperus rotundus* (major plot treatment); (b) plots treated and not treated with 200 gal. per ac. 0·2% MCPA (sub-plot treatment); (c) sowing-date treatments of sub-sub-plots (sowing immediately after, 2 weeks after, and 4 weeks after spraying). The percentage germination and yield of grain and straw on each plot were recorded Neither the herbicide treatments nor the sowing-date treatments had any effect on germination. Plots infested with *C. rotundus* and treated with MCPA yielded 34% more grain and significantly more straw than untreated infested plots, but the yields of grain on these treated plots were less than those from the uninfested plots.—W.J.B.

780 LEUKEL, R. W. **Co-operative tests of seed-treatment chemicals on spring wheat and oats in 1953.** *Pl. Dis. Reptr* 1953, **37,** No. 12, 587-94. [Cereal Crops and Dis. Div., Pl. Industr. Bur., U.S. Dep. Agric.] [Received 1955]

781 LEUKEL, R. W. **Seed-treatment tests on winter and spring wheat and oats for smut control 1953-54.** *Pl. Dis. Reptr* 1954, **38,** No. 11, 755-9. [Fld Crops Res. Branch., Pl. Industr. Sta., Agric. Res. Serv., U.S. Dep. Agric., Beltsville, Md]

782 HESS, N. and PICHLER, F. Versuche der mechanischen Bekämpfung des Weizensteinbrandes (*Tilletia tritici*). [**Attempts to control smut (*Tilletia tritici*) on wheat by mechanical means.**] *PflSch. Ber.* 1954, **13,** No. 11/12, 177-82, bibl. 2, illus. [Saatzuchtbetrieb, Reichersberg; and Bundesanst. Pflanzenschutz, Wien, Austria]

On passing wheat seed through a specially constructed machine equipped for brushing and rubbing away the spores of *Tilletia tritici*, the wheat seeds became free of the spores but were so injured by the process that it is not recommended.—D.B.

783 DUFF, A. D. S. **Resistance to "take-all" disease in Kenya wheat 131.** *E. Afr. agric. J.* 1954, **20,** No. 2, 120-1, bibl. 3. [Dep. Agric. Kenya]

Experiments were conducted to determine the effect of *Ophiobolus graminis* on wheat 131 and on 4 other varieties for comparison. Results show that the variety 131 developed a more extensive root system than did the other varieties and that it was positively resistant but not immune to take-all.—M.P.

784 MOSEMAN, J. G. and others. **Reaction of wheat varieties and selections to the soil-borne viruses in south-eastern United States.**

Pl. Dis. Reptr 1954, **38,** No. 1, 19-24. [N. Carolina and Virginia Agric. Exp. Stas]

785 Iljinskaja-Centilovič, M. A. and Rožděstvenskiĭ, V. D. [**The structure of secondary roots in relation to lodging resistance in varieties of winter wheat.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **100,** No. 4, 801-3, bibl. 5, illus. [Harjkov Agric. Inst.]

The authors' studies of the root system in winter wheat varieties have shown that there is a close relation between the characteristics of the above-ground organs and the structure of the roots. The varieties were : the non-lodging types Lutescens 17 and Erythrospermum 107 ; the variety Lutescens 266 which has medium resistance to lodging; and the varieties Hostianum 237 and Odesskaja 3, susceptible to lodging. From observations on numerous specimens during 2 years (in the autumn and spring) at the above Institute, it was noticed that in non-lodging varieties fibrous roots developed poorly ; the roots were thick, coarse and spread radially outwards from the tillering nodes. Types susceptible to lodging had numerous fibrous roots which penetrated downwards below the tillering node. In the varieties showing resistance to lodging, there were some specimens which had root systems resembling either one or the other of these two types. Among the varieties susceptible to lodging there were individual plants in which the root system was characteristic of the resistant types. It is postulated that if these plants are selected in an early developmental phase and grown under favourable conditions, it should be possible to evolve a non-lodging type of winter wheat. By study of the anatomy of the secondary roots in the different varieties the distinction made on a morphological basis in regard to lodging resistance can be confirmed and it is postulated that in early selection work evaluation of lodging and non-lodging types can be made from an anatomical/morphological analysis.—M.H.

786 Zanini, E. Influenza di diversi livelli della falda idrica sullo sviluppo ipogeo ed epigeo di alcuni grani teneri (*Tr. vulgare* Willd.) e duri (*Tr. durum* Desf.). [**Influence of different water-table levels on the hypogeous and epigeous development of some varieties of soft wheat** (*Triticum vulgare* **Willd.**) **and durum wheat** (*T. durum* **Desf.**).] *Lav. Ist. bot., Palermo* 1954, **14,** pp. 37, bibl. 17, illus.

In the 5 years' trials described, the experimental wheat plants were grown in pots 24 cm. high, filled with calcareous pebbles for the lower 15 cm. and sieved soil for the next 6 cm. The pots were kept in 4 cement tanks in which a constant level of water was maintained. The surface of the soil was at 6, 10, 13 and 16 cm. from the level of the water in the 4 tanks, respectively. Results are given for each year. The principal general conclusions were : (a) all the varieties tested, which included both autumn and spring types, either sown early or late in spring, developed and ripened their seed normally when grown with the 2 intermediate water-levels ; (b) when these varieties were sown late in spring, the plants grown with the lowest water-level, were more stunted in growth than were the plants grown with the highest water-level, their root system consisted mainly of long embryonal roots, while that of the plants grown at the highest water-level consisted mainly of short, thick adventitious roots ; (c) when the varieties were sown early in spring, those grown with the highest water-level were stunted in growth while those grown with the lowest water-level developed normally ; (d) the durum varieties, especially Russello S.G.7, were more adapted to conditions of low water-level than were the soft varieties.—E.B.O.

787 Singh, R. M. **Effect of iron on heading of wheat.** *Curr. Sci.* 1955, **24,** No. 1, 19-20, bibl. 3. [Agron. Sect., B.R. Coll., Agra, India]

788 Račinskiĭ, V. V. and others. [**The effect of light intensity on phosphorus in the metabolic processes of spring wheat at different periods of the plant's ontogeny.**] [Russian] *Biohimija* (*Biochemistry*) 1954, **19,** No. 5, 513-20, bibl. 14.

789 Penner, E. **The effect of P^{32} radiation on crop growth and phosphorus uptake.** *Canad. J. agric. Sci.* 1954, **34,** No. 2, 214-21, bibl. 7. [Soil Sci. Dep., Univ. Saskatchewan]

The results are presented of trials in 1951-2 on three soil types in Saskatchewan to assess the effect of P^{32} on the growth of Thatcher wheat in the field. Treatments used were 24 lb. per ac. of $NH_4H_2PO_4$, containing up to 3600 microcuries of P^{32} per g. of P^{31}. The level of 3600 microcuries was greater by a factor of 36 than that generally used in field trials with P^{32} as a tracer. Within the range of specific activities used (12-3600 microcuries) both stimulatory and injurious effects were noted; these effects were thought to be related to variations in environmental conditions. A comparison of the data from the two seasons' experiments were thought to indicate that observations from any one set of experiments would not provide conclusive evidence on which to base the accurate assessment of radiation effects. Of 10 separate harvests in these experiments, 4 showed significant deviations in plant growth from controls, attributable to radiation in at least two of the criteria studied, but only in two harvests were the deviations sufficient to arouse concern. It was not

possible, over the range of activities used, to indicate a level of radiation activity at which the absence of radiation effects could be guaranteed. It was concluded that these findings did not suggest any insurmountable reason why P^{32} should not be used as a tracer in plant studies, but that field trials should be so designed that any radiation effects can be detected if they occur.—P.J.B.

790 PASCALE, A. J. and DAMARIO, E. A. El índice heliotérmico aplicado a los trigos argentinos. [**Application of the heliothermic index to Argentinian wheats.**] *Meteoros* 1954, **4,** No. 3, 129-57, bibl. 18, illus., English summary p. 129. [Castelar Agromet. Observatory and Rafaela and Balcarce Agromet. Stas]

In experiments in 1950-3, 37 varieties of Argentinian wheat were sown at fortnightly intervals from March to October of each year. Requirements of temperature and photoperiod for the period emergence to ear-formation were calculated for each variety and for each sowing, using Geslin's heliothermic-index method. The index was found to give a satisfactory picture of the outstanding differences between the temperature- and photoperiod-requirements of the varieties, which, on the basis of the results, were classified into the following four groups: (a) varieties which are indifferent (under the conditions of the trials) to day-length and have no cold requirement, (b) varieties which require long days (14 hr. or more) in order to reach the reproductive stage but have no cold requirement, (c) varieties requiring long days and having a moderate cold requirement, (d) varieties which require a definite number of cold days and relatively short daily photoperiods (12-14 hr.).—W.J.B.

791 ALEXINSKY, W. and COÏC, Y. Action des fertilisations azotées semi-tardive et tardive des blés d'hiver sur la qualité boulangère. [**Action of late and semi-late N-manuring of winter-wheat on its baking quality.**] *C.R. Acad. Agric. Fr.* 1954, **40,** No. 17, 656-60, bibl. 2, illus.

792 CARRANTE, V. Risultati dei campi sperimentali di varietà e di azotatura al frumento in Puglia e Lucania nella campagna granaria 1953-54. [**Results from field experiments with varieties and nitrogen manuring of wheat in Puglia and Lucania in the wheat year 1953-54.**] *Publ. Bari Sta. agr. sper.* 1954, pp. 25, illus.

Trials were carried out in 5 localities to compare selected wheat varieties with local varieties and to determine the best doses and time of application of N fertilizers. The durum varieties tested were Cappelli and G. 235, both of a medium vegetative cycle, and the soft varieties Elia, Salto, M.5, Libero, S.13, Maiorica 47, Emanuel, Ovest, all of a medium vegetative cycle, and Roma, Mara, Funo, early. Some of these varieties were tested in all 5 localities, others in 2-3 only. Three methods of applying N fertilizers were tested: (a) 300 kg. of ammonium sulphate per ha. applied at sowing; (b) 400 kg. of calcium nitrate per ha. applied as a top-dressing when the plants had 4 leaves; (c) the same as in (b) but 100 kg. applied when the plants had 4 leaves and 300 kg. when the plants had 7 leaves. Tabulated results show data of yield, hectolitre weight and weight of 1000 seeds. The principal conclusions from 1-year trials were: (a) N manuring raised yields in most cases, but at the high doses tested it was economically advantageous with Elia, M.5 and S.13 only, the best result being obtained by applying the N in 2 stages; (b) the selected varieties yielded more than the local varieties, the best being Elia, Salto, M.5, Mara, Funo, Libero and G.235; (c) the application of N and the use of selected varieties increased the hectolitre weight of the seeds.—E.B.O.

793 ANANT RAO, N. K. and others. **The effect of increasing levels of phosphate on berseem and the residual effect on wheat.** *Allahabad Fmr* 1954, **28,** No. 3, 66-70, bibl. 6. [Dep. Agron., B.R. College, Agra, India]

The effect of phosphatic manuring on the yield of berseem [*Trifolium alexandrinum*], and on the yield of the succeeding wheat crop, was determined in 2 experiments in 1950-3. In the first experiment, berseem, following fallow, was sown in November 1950 and harvested in 1951; winter wheat was then sown after summer fallow and harvested in 1952. In the second experiment, berseem, following sorghum, was sown in November 1951 and harvested in 1952; winter wheat was then sown after summer fallow and harvested in 1953. In both experiments phosphate was applied to the berseem crop at 0 (control), 66, 132, 198 and 264 lb. P_2O_5 per ac. Averaging the results of the 2 experiments, the 66 and 132 lb. levels of phosphate application gave increases in the yields of berseem (green matter) of 50-60% compared with the control, while the 198 and 264 lb. levels gave increases of 80-90%. The berseem seed harvest (which was taken in both experiments) was increased by 17-20% by the phosphate applications. There was a significant residual effect from the phosphatic manuring of berseem on the succeeding wheat crops in both experiments. The average (for the two experiments) yields of wheat grain obtained with 0, 66, 132, 198 and 264 lb. P_2O_5 per ac., applied to berseem, were 19·5, 23·7, 24·5, 24·3 and 24·6 maunds per ac. [1 maund = 82·29 lb.] Thus, applying 66 lb. P_2O_5 to berseem gave a significant increase (of 21·5%) in the wheat grain yield but greater applications of P_2O_5 gave no significant

further increase. The phosphate applications also increased wheat straw yields by about 20%.—W.J.B.

794 CHANDNANI, J. J. **Manuring of wheat.** *Indian J. agric. Sci.* 1954, **24,** Pt. 3, 195-211. [Indian Agric. Res. Inst., New Delhi]

The results of numerous experiments on the manuring of winter wheat, carried out under the direction of the author in 1948-52, are reviewed. The main results are summarized below. Nitrogen is the nutrient most required by wheat on the soils tested, although additions of P_2O_5 were also generally required. The optimum application of farm-yard manure appeared to be 10-15 tons per ac. (approx. 100 lb. N per ac.), applied 7-8 weeks before sowing; such applications, compared with no treatment, gave increases in yields of wheat grain of 14-38%. The optimum dose of groundnut cake per ac. (one containing 40 lb. N) gave an increase in grain yield of about 20%, compared with no treatment. Compared with no treatment, green manuring with *Cyamopsis psoralioides* and *Crotalaria juncea* gave yield increases (about 35%) greater than those obtained with *Vigna sinensis* (23%), *Sesbania aculeata* (27%) and soyabean (27%). The optimum dose of nitrogenous artificial fertilizer per ac. contains 20 lb. N. Ammonium sulphate, ammonium nitrate, Chilean nitrate and urea, applied at 20 lb. N per ac., gave increases in grain yields over control (no manure) of 45·7, 40·0, 38·2 and 30·2%, respectively, in trials in 1949-52. The best time for applying artificial nitrogenous fertilizers appeared to be at the first irrigation. There were varietal differences in the response to applications of N; of the varieties tested N.P. 12 and N.P. 4 gave the greatest response.—W.J.B.

OATS

795 BELL, R. A. M. **Spring oat variety trials, 1946-1953.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 5-13, bibl. 3.

Two trial series of spring oats are reported over the period 1946-53. The material tested was specificially bred for Scottish conditions and trials were confined almost entirely to the area north of the line Mersey to Humber. The varieties tested were Albyn Donside, Ayr Ally, Ayr Commando, Craig's Afterlea, Aa 698, Aa 712, Aa 714, Aa 720, Aa 725, and Aa 729. Victory was used as the control in the early series, giving place to Sun II in the later years. Detailed figures of yield of grain as a percentage of the control and of husk content are given, together with detailed notes of the field characters and performance of each variety. No variety equalled Sun II in yield; several were from 5 to 10 days earlier in maturing.—Author's summary.

796 KELLY, A. F. **Spring oat variety trials 1949-53.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1 14-23, bibl. 3.

Trials in which the 8 varieties: Blanche du Vieu Moulin, D.1670, Express, Flamingstreue, Forward Gartons' 401, Marne, Onward and Reagle were compared with Sun II or Victory are reported None of these varieties showed any improvemen in yield or quality of grain over Sun II, althoug all except Flamingstreue and Gartons' 401 gav better yields than Victory and Onward. In othe features also no marked improvement over Sun I could be demonstrated.—From author's summary

797 EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE. Field Experiments Committee. **A report on three years' experimentation with oat varieties, 1951 to 1953.** *Tech Bull. 11. Edinb. E. Scot. Coll. Agric.* 1954 pp. 15.

From trials carried out in several localities wit 12 varieties of oats, data were obtained on grain and straw-yields, order of ripening, straw-strengt and straw-length. Minor was the most promisin of the varieties and compared well with Sun II the control. Notes are given on the varieties used —M.P.

798 AASTVEIT, K. Sortforsøk med havre på sø Østlandet i perioden 1939-52. **Variety trial with oats in south-eastern Norway durin the period 1939-52.** *Forskn. Fors. Landb* 1953, **4,** No. 5, 461-83, bibl. 27, Englis summary 479-80. [Fm Crop Inst., Agric Coll. Norway, Vollebekk]

In these 94 yield trials, Gullregn II was used as standard and gave a mean grain yield of 274 kg per decare (0·1 ha.). Sisu, Sol II, Ørn, Rygja an Blenda gave respective mean yields 18, 11, 10, 8 an 7 kg. per decare, more than Gullregn II. The yield of Sisu, Sol II and Ørn were significantly higher tha those of the standard. Sisu was under test for 2 year at Vollebekk and for 1 year, only, at other location The incidence of lodging in Sol II, Rygja an Merkur (which gave the lowest mean yield o 33 kg. per decare below that of Gullregn II) wa much less than in Gullregn II. Mean yields o Gullregn II, Ørn and Bambu were 18 kg. pe decare higher on clay than on sandy soil. As preceding crop, pasture was best, followed by root potatoes, cereals and peas. In studies on the re quirements for temperature and rainfall, there wa a significant positive correlation between rainfa after heading and grain yield, also a significan negative correlation between temperature befor heading and yield. It is recommended that Sol I or Blenda should be used in the southern part o the trial region, up to 300 ft. a.s.l., and that Blend and Bambu be used in the northern part of th region. Sisu has shown better straw-stiffness tha

Gullregn II and has good grain quality. Sisu was later in maturing (2-3 days) than Gullregn II and was considered too late for growing in any but the southern part of the trial region.—P.J.B.

799 HAGBERTH, N. O. Nyare havresorter för södra och mellersta Sverige. [**Newer oat varieties for south and central Sweden.**] *Weibull's ill. Årsb.* 1954, **49,** Spring, 30-1.

Notes are given on Blenda, Sisu and Rex. In trials during 1944-52 in Svealand and Götaland, Blenda has outyielded Guldregn II by over 8%, and Sol II by over 3%. Blenda matures a few days earlier than these varieties, has a very high kernel percentage, 1000-grain weight and hectolitre weight. Its straw-stiffness is not as good as that of Sol II, but is better than that of Rex. Sisu, a Finnish variety, has given yields only 0·5% lower than those of Blenda in over 270 official trials in south and central Sweden. It matures at the same time as, or a few days later than, Sol II and has stiffer straw. It is recommended for cultivation primarily in the Mälar and Hjälmar districts. Rex, a Danish variety, has given 0·7% higher yields than Blenda in over 300 official trials. It is about the same as Sisu in respect of time of maturation and has satisfactory straw-stiffness, though here it is inferior to Blenda and Sisu. It is recommended for cultivation in all parts of south and middle Sweden where straw-stiffness and early-maturity are not of overriding importance.—P.J.B.

800 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. Forsøg med havresorter 1949-1952. [**Trials with oat varieties 1949-1952.**] *Medd. 496. Tidsskr. Planteavl* 1954, **57,** No. 355-7.

Trials with 8 oat varieties were carried out at 12 locations on mineral soils, and on peat soils at 2 locations. On the mineral soils, Pajbjerg Rex A gave the highest mean yield of 43·3 hkg. per ha. Yields of the varieties Svaløf Blenda, Svaløf Stål, Borris Opus II, Svaløf Ørn E and Abed Palu ranged from 42·2 to 42·4 hkg. per ha. Svaløf Nr 01430 b and Pajbjerg Regent, which were tested during 1951-52, only, gave average yields of 42·7 and 41·7 hkg. per ha., respectively. On peat soils, highest yields were given by Svaløf Nr 01430 b, Pajbjerg Regent, Pajbjerg Rex A and Svaløf Stål, with 43·9, 43·6, 43·5 and 43·4 hkg. per ha., respectively. On low moor soils, Borris Opus II, Abed Palu and Pajbjerg Regent gave the highest yields, with 36·3, 35·9 and 35·6 hkg. per ha., respectively. Highest straw yields (on mineral soils) were given by Svaløf Nr. 01430 b and Pajbjerg Rex A, with 56·9 and 51·9 hkg. per ha., respectively. Tendency to lodge was greatest in Borris Opus II, Svaløf Ørn E and Pajbjerg Rex A, and least in Pajbjerg Regent. Brief notes are given on each variety.—P.J.B.

801 MOREY, D. D. **Improvement of oats, rye, wheat and barley through breeding for desirable agronomic characters and resistance to disease.** *Rep. Univ. Fla agric. Exp. Sta. 1953* [n.d.], 49-50.

Two new oat varieties are recommended for release in Florida. They are : Sunland (C.I.6600) selected from a Fulghum 708 × Landhafer cross and Seminole (C.I.5924), selected from a cross Appler × Clinton-Santa Fe. In trials in the 1952-3 season, the average yields of Sunland, Seminole, Southland, Floriland, Victorgrain 48-93 and Red Rustproof were 52·7, 54·2, 50, 52·5, 52·5, and 36·3 bu. per ac. Sunland is a tall variety, with resistance to crown rust [*Puccinia coronata avenae*] and has given high forage yields. Seminole is a short-strawed variety, with resistance to crown rust, *Helminthosporium victoriae*, culm rot and smut [*Ustilago* sp.] and has given high forage yields.—P.J.B.

802 ATKINS, I. M. and RIVERS, G. W. **Alamo oats.** *Bull. 778. Texas agric. Exp. Sta.* 1954, pp. 7, illus.

Alamo is adapted for spring sowing throughout northern Texas and for winter sowing in southern Texas. In trials at 8 locations during 1947-53, spring-sown Alamo gave average yields of 54 bu. per ac., compared with 46·9 for Fultex, 46·1 for Frazier, 48·2 for Mustang and 38·4 bu. for New Nortex. In trials in south, central and northern locations during 1947-52 and in the U.S.Dep. Agric. regional trials in 1950-3, at southern locations Alamo gave average yields of 50·3 bu. per ac. and outyielded all other varieties by a considerable margin. At central locations, Alamo was outyielded by Mustang and New Nortex, and at northern stations was outyielded by Mustang and New Nortex by a considerable margin and also by Fultex. Alamo has a high degree of resistance to current races of crown and stem rust in Texas and is susceptible to *Helminthosporium victoriae*. It is early-maturing and stiff-strawed, has a high test weight and an almost awnless, red seed. It is considerably less frost-resistant than Mustang or New Nortex.—P.J.B.

803 SEED WORLD. **Cimarron, new "two-way" oat.** *Seed World* 1954, **75,** No. 4, 8.

Cimarron, an early-maturing variety, is adapted to the northern and western parts of Oklahoma, where it produces high yields following either autumn or spring sowings. In 4-years' tests at Stillwater, spring-sown Cimarron yielded an average of 37·4 bu. per ac., compared with 38·2 bu. for Andrew, a true spring variety, and outyielded Kanota by 4·4 bu. per ac. In 5-years' tests at 4 locations, Cimarron, autumn-sown, outyielded other winter varieties by 12-17%. In State trials in its area of adaptation, Cimarron was approximately equal in yield to other winter-hardy varieties.—P.J.B.

804 HUTCHINSON, J. B. **Oat kernels with decayed embryos : a factor in the germination capacity of oats.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 24-32, bibl. 8.

The occurrence of oat grains of sound external appearance, which, on shelling, reveal kernels with decayed embryos, was investigated on a comprehensive range of seed-, milling- and feed-oat samples from England and Scotland. The evidence adduced points to pre-harvest factors as the cause of death. —C.L.S.

805 THOMSON, J. R. **The effect of seed dressings containing an organo-mercurial and gamma BHC on germination tests of oats.** *Emp. J. exp. Agric.* 1954, **22,** 87, 185-8, bibl. 4. [Seed Testing Sta., Dep. Agric. Scotland]

Germination tests with seed oats dusted with a mixture of organo-mercurial and gamma BHC showed that the production of abnormal seedlings was a significant injurious effect, but too small to be of any practical importance. The harmful effect was mostly confined to the groats. The number of abnormal seedlings tended to increase with length of storage of the dusted seeds and to be greater if sand, instead of soil, was used as the germinating medium.—M.P.

806 KOEHLER, B. and BEVER, W. M. **Oat and wheat seed treatments : methods, injuries, and gains.** *Pl. Dis. Reptr* 1954, **38,** No. 11, 762-8, bibl. 8. [Illinois Agric. Exp. Sta., Urbana]

Studies were carried out in Illinois to obtain information on the following : (a) methods of storing small lots of seed treated with volatile fungicides until sowing, so as to reproduce storage conditions on farms, (b) the effect of the moisture content of the seed on susceptibility to damage by fungicides, (c) the respective injury caused to stored seed by different fungicides, and (d) the effect on yields of treating and then storing seed relatively free from pathogenic infection. Holding the treated seed in sealed 1 pt. jars for 3 days, thereafter followed by opening the jars, most nearly simulated farm storage conditions. Seed with moisture contents of 11·4, 13·9 and 16·7% was treated with Panogen and Ceresan M and stored in sealed containers for up to 8 weeks. Germination percentages of seed with 11·4 and 13·9% moisture contents were very similar. Increasing the time of storage and also the moisture content from 13·9 to 16·7% markedly reduced germination ; this effect was much less apparent where Panogen was used than where Ceresan M was used. Wheat and oat seed was treated with a number of volatile and non-volatile fungicides before storing for 10 months in sealed jars. At the recommended rates of treatment, almost all the volatile materials significantly reduced germination ; with oats, Ceresan M, Agrox and Mergamm significantly reduced germination in the variet Clinton, but not in Mo. 0-205. From trials on th effect of seed treatment on the yield of relativel disease-free oats, it was concluded that wher lightly-infected, or disease-free, seed is to b treated and stored for more than 2 weeks befor sowing, half the normal rate of Ceresan M shoul be used. With Panogen, best yields from simila seed were obtained following treatment at th full rate.—P.J.B.

807 HUTCHINSON, J. B. and MARTIN, H. F **The chemical composition of oats. 1. Th oil and free fatty acid content of oats an groats. 2. The nitrogen content of oats an groats.** *J. agric. Sci.* 1955, **45,** Pt. 4, 411-27 bibl. 29. [Res. Ass. Brit. Flour-Millers St Albans]

Grain samples from several spring varieties of oat grown in different localities in England an Scotland, and winter varieties grown in Englan were analysed for oil and N content and free fatty acid content of the oil. The oil content varied fro 3·0-8·5% (dry-weight basis) and was mainl dependent on the kernel content and variety of th oats. The Scottish samples contained an averag of 6·5% oil and the English samples 6·2%. Environment was found to be an important factor deter mining N content, the groat samples from Scotlan containing 2·07% N, and from England 2·4%. I is suggested that the level of available N in the soi prior to heading may affect the N-content of the grain. A negative correlation was found betwee oil and N-content of the groat. The free fatty-acid content of the oil in the kernel of sound grai varied from 3-10% and was significantly dependen more on environmental conditions during cultiva tion, harvest and storage and less on variety. The free fatty-acid content rose within a few days o milling or pulverization.—M.P.

808 STUKE, H. Eine Schnellmethode zur Bestimmung des Spelzengehaltes beim Hafer. [**A rapid method for determining the husk content in oats.**] *Züchter* 1955, **25,** No. 3, 90-2, bibl. 5, illus. [Martin-Luther-Univ. Halle-Wittenberg, Hohenthurm, E. Germany]

A laboratory apparatus for the mechanical removal of husks from oats, developed at the above-mentioned institution, is described. The husk content of oat samples was slightly, though not significantly, higher after machine-husking than after hand-husking.—D.B.

809 ELLIOTT, J. G. and FRYER, J. D. **The effects of MCPA (sodium) and 2,4-D (amine) applied to spring oats at the 1 to 3 leaf stage.** *Paper read at 2nd Brit. Weed Contr. Conf., Harro-*

gate 1954 pp. 7, bibl. 1. [A.R.C. Unit of Exp. Agron.]

The trials reported were made to compare the effect of 2,4-D and MCPA applied to oats at the - to 3-leaf stage, with similar treatments made at the 6-leaf stage. In 1 trial in 1953, 2,4-D triethanolamine salt and Na MCPA at rates of 1 and 2 lb. acid equivalent per ac. were applied to oats at 3 growth stages between the 1-leaf and 6-leaf stages. In 5 trials in 1954, 2,4-D triethanolamine salt at rates of 0·25 and 0·75 lb. a.e. per ac. and Na MCPA at 0·75 and 1·5 lb. a.e. were applied at the 1- to 3-leaf and 6-leaf growth stages, using 7·2 gal. spray volume per ac. Of 44 possible comparisons, weed control following treatment at the 1- to 3-leaf stage was superior to that at the 6-leaf stage ; in most cases, low rates of MCPA and 2,4-D applied at the early growth stage gave better weed control than the higher rates of treatment at the 6-leaf stage. MCPA treatments at the 1- to 3-leaf and 6-leaf stages caused no visible deformities in the oats ; at both growth stages, 0·75 lb. 2,4-D per ac. caused slight malformations. Yield results following the 1954 treatments were negative in most cases ; in one case where 0·75 lb. MCPA per ac. was applied at the 2-leaf stage, yield increases were significantly (5% level) higher than where the other MCPA treatments were used and yields were higher than controls. In the 1953 trials, applications of 1 and 2 lb. MCPA and 2 lb. 2,4-D per ac. at the 3-leaf stage resulted in highly significant yield increases ; while the same treatments at the 6-leaf stage caused slight yield decreases. In the 1953 trials, conditions favoured early, vigorous weed growth. In 1954, weather conditions favoured late germination of weeds and prevented their seriously competing with the oat crop. It is concluded that Na MCPA can be used on oats in the 1- to 3-leaf stage with no harm to the crop.—P.J.B.

810 RADEMACHER, B. **Concerning the influence of cold periods on the effect of 2,4-D and MCPA on oats.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 3, bibl. 7. [Inst. PflSchutz Landw. Hochschule, Stuttgart-Hohenheim, Germany]

Observations are made on the tendency to replace 2,4-D by MCPA as a weed-killer for cereals in northern Europe, as a result of the relatively greater crop injury caused by 2,4-D. In south Europe, this trend has not become apparent. It has been found that injuries in cereals caused by 2,4-D appear to be associated with night frosts and cold spells in May. Pot trials, using Carstens VI oats, were carried out to study the effect of cold on the reaction of oats to 2,4-D. The oats were sown on 24 April. On 18 May, when tillering had begun, 24 pots were placed in a lighted refrigerator for 6 days and exposed to fluctuating temperatures, dropping to —5°C. during the night. The remaining 16 pots were left in the open during this period, in rather warm conditions. On 24 May, all pots were placed in the open until harvest. Before, during and after the cold treatment, different pots were treated with 1·5 kg. 2,4-D Na salt per ha. This rate was 1·5 times the normal and was applied at a time when injuries to the plants could be expected. Plants kept in warm conditions suffered a 60% loss of leaf and up to 26% of the spicules were deformed, but no grain or straw yield decrease followed the treatments. 2,4-D applied just before the cold treatment caused no yield reduction. 2,4-D applied during, or just after, the cold treatment caused grain yield reductions of up to 10%. Field trials confirmed these results. In these trials, 2,4-D and MCPA triethanol amine salts were applied either at the beginning of tillering in warm conditions, or immediately after frost, with a ground temperature of —4·6°C. Treatments with either herbicide during warm weather caused no injury. Treatment with 2,4-D after frost reduced grain yields by 13·3%, while the MCPA treatment after frost caused no yield reduction.—P.J.B.

811 BOCKMANN, H. Beobachtungen über den Einfluss von Hormonmitteln auf die Standfestigkeit des Hafers. [**Observations on the effect of hormone-containing substances on rigidity of oats.**] *NachrBl. dtsch. PflSch-Dienst., Stuttgart* 1954, **6,** No. 1, 9-11, bibl. 3. [Biol. Bundesanst., Kiel-Kitzeberg, W. Germany]

Lodging in oats was not an invariable consequence of hormone treatment. It occurred only when the crops had been treated at the tillering stage. The degree of lodging was higher in Adlerhafer than in Flämingsgold. The substances investigated were the Na and amino salts of 2,4-D, MCPA, and 2,4,5-T.—D.B.

812 WILLIAMS, J. H. **Differential varietal response of oat varieties to 2,4-dichlorophenoxyacetic acid.** *Agron. J.* 1954, **46,** No. 12, 565-9, bibl. 14, illus. [Iowa Agric. Exp. Sta., Ames]

In field trials in Iowa in 1950, 13 oat varieties were treated with 0·5 and 1 lb. 2,4-D butyl ester in 40 gal. spray volume per ac. ; in 1951, the same varieties were treated with 1 lb. 2,4-D only, and two varieties, Andrew and Cherokee, representing resistant and susceptible varieties based on the results of the 1950 trials, were treated with 2,4-D at 15 growth stages from the 2-leaf stage to the heading stage. In the trials with 13 varieties, spray applications were made at 26, 30 or 34 days after sowing, so as to ensure that all varieties were treated while the apex was passing from the vegetative to the reproductive growth phases. Six stages of morphological development were ar-

bitrarily chosen as indices ; these are enumerated and described, with illustrations. In both 1950 and 1951, all treatments reduced mean yields compared with untreated controls. Treatment at anthesis reduced yields in both years, but not significantly in 1951 and at the 5% level of significance, only, in 1951. Plant characters, other than kernel numbers, were not affected by treatment at anthesis. At the first stage of treatment (26 days after sowing), shoot length was highly correlated (r = 0·92) with the 6 indices used to tabulate shoot development ; at the second and third stages, the degree of correlation dropped to r = 0·87 and 0·56, respectively. Yield reductions following treatment were greater where 1 lb. 2,4-D was applied than where 0·5 lb. was applied and the greatest reductions occurred following treatment during the initiation of floral primordia. Differences between varieties in susceptibility to 2,4-D were noted ; Cherokee, Mindo and Colo were relatively susceptible, while Tama, Shelby, Andrew and Clinton were resistant at most growth stages. Yield reductions were closely associated with reductions in the number of kernels per spikelet and spikelets per panicle. The greatest reduction in spikelet number was, in general, caused by treatment when branch initials were differentiating ; greatest reductions in spikelet numbers followed treatment when terminal florets had differentiated in all varieties, and, in most varieties, additional spikelets had differentiated. In the trials with Andrew and Cherokee, all treatments from 21 days after sowing (2-leaf stage) up to 50 days after sowing (jointing stage) caused significant yield reductions, with the greatest reductions occurring after treatment at 33-39 days after sowing. At 33 days after sowing, second-order branches had differentiated and at 39 days after sowing, 2nd-4th floret primordia were present on the terminal spikelet. At each time of treatment, the shoot apex was at the same stage of development, which indicated that differential yield responses to 2,4-D by these two varieties could not be explained by different degrees of development at given dates of treatment.—P.J.B.

813† RADEMACHER, B. Über den Einfluss von Kälteperioden auf die 2,4-D-Wirkung beim Hafer. [**Influence of a cold spell on the action of 2,4-D on oats.**] *Z. Pflkrankh.* 1955, **62,** No. 3, 166-74, bibl. 7, illus. [Landw. Hochsch. Hohenheim, Bavaria]

Damage to cereal crops, particularly oats, after using 2,4-D for the control of weeds, has repeatedly been reported from N. Germany but not from S. Germany or Italy. Pot and field experiments demonstrated that treatment with 2,4-D at the tillering stage, during or immediately after a spell of night frosts, resulted in a 9-15% reduction in yields while MCPA had no adverse effect. These results are strongly supported by a statistical survey in which 2,4-D injury to cereals was correlated with frost periods in 1953, a year of late frosts. For Denmark, Scandinavia and N. Germany, the use of MCPA instead of 2,4-D is recommended. The cause of the 2,4-D injury to cereals has yet to be investigated.—D.B.

814 LEBEN, C. and others. **Effectiveness of certain antibiotics for the control of seed-borne diseases of small grain.** *Phytopathology* 1954, **44,** No. 12, 704-7, bibl. 6. [Wisconsin Agric. Exp. Sta., Madison]

Trials are reported on the effectiveness of Helixin A, B and C, Antimycin A-35 and crude Helixin for the control of oat smut (*Ustilago kolleri* and *U. avenae*) and bunt of wheat (*Tilletia foetida*) and of Victoria blight (*Helminthosporium victoriae*) of oats.—P.J.B.

815 EARHART, R. W. **Effect of certain seed treatments on stand, yield and seedling blight in Sunland oats.** *Pl. Dis. Reptr* 1954, **38,** No. 11, 760-1. [Florida Agric. Exp. Sta., Gainesville]

816 FERRARI, Th. J. and SLUIJSMANS, M. J. Factoren, bepalend voor het optreden van tijgering bij haver. [**Factors contributing to the occurrence of striped leaves in oats.**] *LandbVoorl.* 1955, **12,** No. 2, 54-61, bibl. 6, illus.

Factors contributing to the appearance in the field of the type of discoloration in oat leaves which is a symptom of Mg deficiency were determined in an experiment in which various manures (including MgO and lime) were applied to a Mg-deficient soil. In general an application of 40 kg. MgO per ha. was sufficient to prevent the appearance of the symptoms. A low pH (especially below pH 4·8) and a high content of K in the soil tended to aggravate the symptoms.—W.J.B.

817 CROOKE, W. M. and INKSON, R. H. E. **The relationship between nickel toxicity and major nutrient supply.** *Plant and Soil* 1955, **6,** No. 1, 1-15, bibl. 14. [Macaulay Soil Res. Inst., Graigiebuckler, Aberdeen]

The results are given of experiments to determine the relationship between the level of supply of major plant nutrients, including N, P, K, Ca and Mg, and nickel toxicity in oats grown in sand culture. In a number of localized areas in Aberdeenshire, cereal yields have been seriously reduced by Ni-toxicity ; applications of lime have been a satisfactory means of reducing this toxicity. Symptoms of Ni-toxicity in oats are briefly noted : they are similar to those caused by induced Fe deficiency. In sand culture, the addition of N, K, Ca, or Mg was able to offset some of the yield reduction caused by Ni-toxicity ; this was parti-

cularly noticeable in the case of Ca. P additions on the other hand, enhanced the yield-reducing effect of Ni.—P.J.B.

RYE

818 ANDERSEN, T. Forsøg med såmaengder af rug. 1946-1952. [**Trials on sowing rates of rye, 1946-1952.**] *Beret. 476. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **57,** No. 2, 271-80.

The trials reported were carried out in Denmark at 5 locations. Varieties used were Petkus and (at one location) Borris Perle. Sowing rates were 100, 140, 180, 220 and 260 kg. per ha. and manurial treatments included two levels of N treatments, namely, 250-400 kg. and 500-600 kg. nitrochalk per ha., applied in late April, and sowing dates ranged from 16-24 September. Mean grain yields where sowing rates of 100, 140, 180, 220 and 260 kg. per ha. were used with the lower rates of N treatment, averaged 22·1, 24·1, 35·7, 35·6 and 36·3 hkg. per ha., and 29·4, 31·3, 32·1, 32·1 and 31·7 hkg. per ha. where the higher N rates were used, respectively. Straw yields where the lower N rates were used increased from 39·2 to 44·3 hkg. per ha. and where the higher rates of N were used, from 43·2 to 46·8 hkg. per ha., as sowing rates increased from 100 to 260 kg. per ha. Splitting the N treatments so as to apply 200-300 kg. in mid-April and the rest in early May, increased grain yields by 3·8 hkg. per ha. for the 100 kg. sowing rate, and by 2·4 hkg. per ha. for the 260 kg. sowing rate, compared with where all the N was applied on 29 April. Increasing the sowing rate from 100 to 260 kg. per ha. increased the tendency to lodge from 1·1 to 3·4 units on a scale 0-10 where 10 = completely lodged ; where the higher rates of N were applied, lodging values ranged from 2 to 5 for the same increase in sowing rates. Data are also given of kernel quality and the proportions of plants which survived the winter.—P.J.B.

819 BELL, R. A. M. **Winter rye variety trials, 1947-1950.** *J. nat. Inst. agric. Bot.* 1954, **7,** No. 1, 80-6.

This report deals with twelve trials of seven winter rye strains of English and continental origin in the years 1947-50. The varieties were King II (control), Pearl, Petkus, Steel, Gartons' Large Grained, Selection R.N. 12, and the local commercial strains. The trials were laid out in randomized blocks. Observations were made on early growth, frost resistance, straw characters and maturity. The continental type possessed superior grain yielding abilities, with greater resistance to lodging, and within this group Petkus and Pearl gave rather higher yields than Steel and King II. The native strains, however, possessed an ability to make more rapid and earlier spring growth, enabling their utilisation for spring grazing, in addition to providing a yield of grain.—Author's summary.

820 LÜDERS, R. Beziehungen zwischen Stickstoff- oder NPK-Düngung und dem Phosphorsäure- und Schwermetallgehalt von Pflanzen. [**Relationship between N- or NPK-manuring and the phosphoric acid and heavy metal content of plants.**] *Z. PflErnähr. Dung.* 1955, **68,** No. 1, 56-65, bibl. 12, illus. [Lab. Erdbereitung, Hamburg-Blankenese]

In pot and plot experiments, ryegrass and spring-rye were treated with increasing amounts of N and NPK. In young plants, the content of phosphoric acid and heavy metals (Fe, Mn, Cu and Zn) increased considerably with increasing N- or NPK-manuring, whereas in mature plants, e.g. rye straw, it decreased. The actual increase of each element was different.—D.B.

821 LÜDERS, R. Über die Verteilung von Phosphorsäure und Schwermetallen auf Korn und Stroh des Petkuser Sommerroggens. [**The distribution of phosphoric acid and heavy metals in grain and straw of Petkuser spring-rye.**] *Z. PflErnähr. Dung.* 1955, **68,** No. 1, 66-8, bibl. 4. [Lab. für Erdbereitung, Hamburg-Blankenese]

The analyses reported here show that the contents of phosphoric acid and heavy metals in spring-rye increased from the lower to the upper portion of the stem but, contrary to the accepted teaching, their content in the grain was not necessarily higher than in the stem. Phosphoric acid was nearly 50%, Zn nearly 100% and Fe 33% higher in the upper part of the stem than in the grain, while the amounts of Cu and Mn were similar, in both stem and grain.—D.B.

BARLEY

822 VIGOROV, L. I. [**Protein content of hull-less forms of barley and oats in the grey forest soils of the Central Urals.**] [Russian] *Zemledelie* (*Agriculture*) 1954, **2,** No. 11, 89-92.

During 1949-52 a study was made of 75 varieties of hull-less barleys and 10 varieties of hull-less oats. The plants were grown in experimental plots of the Ural Forest Institute on soils typical for the Sverdlovsk Province, comprising argillaceous, structureless podzols formed under pine forests. The hull-less barley varieties are grouped according to origin (White Russia, Urals, Baltic Coast, Kazahstan, European USSR, Asia Minor, Europe) and information is supplied on grain yields (for the years 1949-51) and on protein content of the grain (1949-52). For comparison, similar data are

given of 3 normal barleys in which the average protein content of the grain is 14·7%. In the hull-less barleys, a protein content above 15% is exceptional, the average being between 11 and 15%. Differences in protein content were shown by the different varieties, irrespective of origin, and are attributed to variation in the capacity of the plants to obtain nitrogen from the soil. In the oat varieties, protein content did not fall below 14·7%, the average being between 18 and 20%. This high percentage is attributed to the unfavourable water regime in the soil, under which the conditions become more suitable for xerophytes; protein content in the oat-grain was increased under drought.—M.H.

823 HEBERT, T. T. **A new method of controlling smut of barley.** *Pl. Dis. Reptr* 1955, **39,** No. 1, 20-2. [N. Carolina State Coll., Raleigh]

The results of the trials reported showed that loose smut (*Ustilago nuda*) on barley seed could be effectively controlled by soaking the seed in tap-water and then placing the drained seed in air-tight containers for different periods. Complete control of smut was obtained by soaking the seed for 2 hr., followed by holding it in air-tight containers for 60 hr. Smut was controlled when as little as 25% of the air-tight container was filled with seed, though the pathogen was killed more slowly under these conditions. No germination of barley seed occurred during air-tight storage. The length of air-tight storage required was related to temperature; at 32°C., 22 hr. was needed, at 24 and 28°C., 42 and 31 hr. were needed, respectively, while at 20°C., 54 hr. storage was not enough to control the pathogen completely. The germination of seed subjected to these treatments, before being dried, was not apparently affected.—P.J.B.

824† KUDRJAVCEV, V. A. [**The importance of light intensity in the formation of generative organs in barley.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1954, **97,** No. 2, 349-52, bibl. 10, illus. [Vorošilovgrad Agric. Inst.]

It has been claimed that an adequate intensity of light falling on the plant during certain periods of its development is important, not only for the accumulation of plastic substances in the leaves, but also for those metabolic processes which take place in spike initials and determine the formation of fertile sexual cells. In order to test this, in 1952 the author designed experiments with the Gruševskiĭ variety of barley which involved shading the plants at different phases of their development and shading parts of the stem where spike initials were formed. The plants were grown (standard method) in culture vessels containing 4 kg. soil. Seed was sown on 22 April, seedlings appeared on 29 April and grain harvest was taken at the stage of full ripeness, 11 July. There were 3 replications of the following variants: (1) plants shaded for 6 days (15-21 May) from the beginning of differentiation of the central spikelet protuberances; (2) plants shaded from the beginning of tetrad formation in pollen mother cells in florets of the central spikelets, for 6 days (26 May-1 June); (3) shading of the spike initials in the main stem from the beginning of their differentiation to tetrad formation in the pollen mother cells of florets in the central spikelets (14-26 May); (4) shading spike initials of the main stem from the beginning of differentiation to earing of the plant (14 May-12 June); (5) shading spike initials of the main stem from the beginning of tetrad formation in pollen mother cells in florets of the central spikelets to earing of the plants (26 May-12 June). In variants 1 and 2 shading the plants was effected by placing them in compartments made of straw mats and lighted only from one (northern) aspect, the sun's direct rays being excluded and light intensity lowered 7 to 12 times; differences in temperature and air humidity were thus rendered insignificant. For shading spike initials, a paper covering with a dark inner surface was used. The data show that the grain yield per spike on the main stem (as percentage of the control) was 15 in variant 2, 31·8 in variant 4, 35·8 in variant 5, 72·3 in variant 1 and 95·8 in variant 3. These results confirm the author's theory and it is concluded that the excessive reduction of grain yield in variant 2 is attributable to the interruption by shading of pollen-cell formation in the flowers of most of the spikelets.—M.H.

825 HOFMANN, E. and AMBERGER, A. Über den Einfluss der N-Form auf Ertrag und Qualität der Braugerste. [**The influence of the form in which N manure is applied on yield and quality of brewing barley.**] *Z. Pflbau* 1954, **5,** No. 3, 123-6, bibl. 6. [Techn. Hochsch., München-Weihenstephan]

The effect of supplying N as sodium nitrate, calcium nitrate, ammonium sulphate, ammonium sulphate with lime, calcium cyanamide and stable manure on yield of grain and straw, percentage of protein in the grain, and 1000-grain weight are tabulated. Results are given of the yield in 1941 (with N fertilizer at 40 kg. N/ha. in addition to basal manuring) and in 1949 and 1952 (at 30 kg. N/ha.). The results appear to be inconclusive because of the different weather during these three seasons.—D.B.

826 NATIONAAL COMITÉ VOOR BROUWGERST. NETHERLANDS. 19de Jaarboekje, 1955. [**19th yearbook of the National Committee for Malting Barley, 1955.**] Rotterdam, 1955, pp. 127, English summaries.

INVESTIGATIONS REPORTED :

(1) The malting quality of new barley varieties. By A. Th. Kortenhorst, pp. 75-82. The malting quality of some new barley varieties was compared with that of the standard varieties, Carlsberg and Piroline. The Norwegian variety Domen and the Finnish variety Pirkka compared well with the standard varieties.

(2) Pheno-climogram for spring barley in the south-west clay region of the Netherlands, 1954. By C. Kramer and W. Wilton, pp. 94-9. The effects of temperature, day-length, cloudiness and rainfall on the development of barley crops in 1954 is illustrated by a pheno-climogram and discussed. The cool cloudy weather was conducive to high yields of barley grain. The grains showed a higher N content and a longer period of dormancy than is the case in normal years.—W.J.B.

MAIZE

827 HARPER, J. L. **Problems involved in the extension of maize cultivation into northern temperate regions.** *World Crops* 1955, **7,** No. 3, 93-6 and 104, illus. [Dep. Agric. Oxford Univ.]

The main requirements of the maize crop (for grain and as a green crop) are outlined, with special reference to conditions in Northern Europe. The growing season for maize is defined by the author as the period between the time when the soil reaches a temperature of more than 50°F. (or the last killing frost if this occurs later) and the first killing frost of autumn. The desirability of breeding maize varieties capable of germination and growth at lower temperatures than are the varieties used at present, is pointed out. The ability of seeds and seedlings to resist early rotting and blights is discussed : in general, flint varieties are more resistant than dent varieties and well-ripened grain is more resistant than partially ripened or artificially dried grain. In laboratory tests imitating field conditions, cracking of the grain coat (caused by harvesting and threshing processes) predisposes grain to rotting. In these laboratory tests, maize grains are sown in a damp soil and subjected to a temperature of 41°F. for a week or more and then transferred to a higher temperature (68°F.), suitable for rapid germination. Germination and emergence figures obtained in this way are closely correlated with emergence in the field. TMTD seed-dressings are recommended as a protection against soil-borne organisms responsible for rotting. It is pointed out that an efficient method of repelling rooks is necessary in order to avoid the serious reductions in stands caused by these birds. Experiments at Oxford (by J. W. Ludwig) have shown that a significant influence on the length of the sowing-to-emergence period is exerted by the aspect of slopes on which maize is planted. Seedlings from seed sown on 20 April on a south-facing, 22·5° slope emerged 2 days before seedlings grown on level ground, and 4 days before seedlings grown on a north-facing, 22·5° slope. The advantage of sowing on a south-facing slope was even more marked in the case of an earlier sowing (30 March). Virginian White Horsetooth, a variety which does not normally ripen in England, yielded ripe grain when grown on the south face of artificial mounds of 22·5° elevation at Oxford. In dry countries, such as those of southern and eastern Europe, ample rainfall (or irrigations) at certain critical periods, notable at sowing and at silking, is essential.—W.J.B.

828† DROZDOV, N. A. [**The advancement of maize cultivation towards the north.**] [Russian] *Priroda, Moskva* (*Nature, Moscow*) 1955, **44,** No. 3, 73-7, illus.

An account is given of : (1) yields of the maize crop grown for silage in various regions of USSR, notably in White Russia and the Moscow, Tula and Leningrad districts ; (2) the botanical features of maize ; (3) maize varieties grown in USSR for silage (Partizanka, Dnepropetrovskaja, Hybrid VIR42, Leningradka, etc.) ; and (4) biological features, with special reference to the varieties Leningradka, Harjkovskaja White Dent and Voronežskaja 76.—M.H.

829 BECKER, W. R. De technische ervaringen opgedaan bij de "maiskernen." [**Experiences of maize-growing at the "maize centres."**] *LandbVoorl.* 1955, **12,** No. 2, 77-83, bibl. 2, illus. [Cent. Inst. Agric. Res., Wageningen]

The experiences of the "maize centres" in the Netherlands (set up to encourage maize-growing, under supervision of the advisory service, by farmers without experience of the crop) as recorded in the results of a survey, are presented and discussed. The Netherlands are divided from north to south (a map accompanies the article) into 4 climatological regions where it is recommended that early, medium-early, medium-late and late varieties of maize, respectively, should be grown. It was found that the varieties recommended for each zone were not in fact always used. On an average, yields in the 2 southerly zones were 11% greater than in the 2 northerly zones. Yields tended to increase with increasing distances of the water-table below the surface, down to a level of 1 m. below the surface in sandy soils and 1·25 m. in other soils. Below these levels there was no further increase of yields with increasing depth of water-table. Yields of maize rose with increasing applications of farm-yard manure up to 20 metric tons per ha. In certain cases where comparisons were made, green manuring gave yields 11% greater than those

obtained without it. Applications of N gave marked increases in yield of maize grain up to the level of 100 kg. N per ha. A study of the relationship between plant populations and yields in 4 different groups of varieties showed that good yields of grain were obtained with a wide range of plant populations. Nevertheless, the results were not at variance with the plant populations normally recommended for the different varietal groups. —W.J.B.

830 DUNCAN, E. R. **Influences of varying plant population, soil fertility and hybrid on corn yields.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 4, 437-40, bibl. 7. [Iowa Agric. Exp. Sta., Ames]

In the trials reported, 3 maize hybrids, one classified as early, one as adapted and one as late, were grown at 4 widely-spaced locations; one in Iowa and three in Minnesota. Field stands were thinned to give plant populations of 8, 12, 16, 20 and 24 thousand per ac. and manurial treatments at each location were: (a) no manure, (b) 1000 lb. 10-10-10 (NPK) per ac. ploughed under+200 lb. 33·5-0-0 per ac. as a side-dressing on, or near, 1 July. At no location had maize yields over 60 bu. per ac. been obtained before. At all locations, manurial treatment increased maize yields. The response over all plant populations used ranged from 34-102 bu. per ac. at the location in Iowa on inherently infertile soil, to 6·2-44·1 bu. per ac. at a location in west-central Minnesota. At all locations where manures were used, the lowest maize yields were obtained where the lowest plant populations were used and the highest where the highest populations were used. Where no manures were used, yield responses to increased plant populations were not consistent, but yields tended to rise as plant populations increased to 16 thousand, except at the location in Iowa. Increasing plant populations from 8 to 24 thousand caused yield responses ranging from a reduction of 22·7 bu. per ac. where no manure was applied, to an increase of 64·8 bu. per ac. where manure was applied. At plant populations up to 16 thousand per ac., where manure was applied, the late hybrid tended to outyield the adapted and early hybrids; at higher plant populations, the adapted hybrid gave equal or higher yields.—P.J.B.

831 GOOR, G. A. W. van de. **Agronomic research on maize in Indonesia.** *Publ. 135. Contr. gen. agric. Res. Sta., Bogor* 1953, pp. 72, bibl. 29, illus. [Received Feb., 1955]

A general account is given of maize-growing in Indonesia and numerous experiments dealing with specific problems associated with maize-growing are described. The average yield of grain in Java and Madura is estimated to be only 9·5 q. per ha. [about 7·5 cwt. per ac.]. It is considered that flint varieties are most suitable for Indonesian conditions, which demand a quick-maturing variety with a palatable grain, able to withstand drought and the low N- status of the soil. Experiments in the main maize-growing regions showed that N was the plant nutrient most generally lacking in soils. Applications of N up to 3 q. per ha. ammonium sulphate (1 quintal = 100 kg.) increased maize-grain yields up to about 40 q. per ha. but higher rates of application gave diminishing returns. The highest yields of grain were obtained when applications of ammonium sulphate were split (usually equally) into 2 dressings which were applied at 0-3 weeks after sowing and again at 3-8 weeks after sowing. In numerous experiments maize yields benefited from the use of green manures; this was especially true of young volcanic soils. In one experiment in which the straw of the previous crop of rice was either burnt (the usual practice) and turned under, turned under unburnt or removed from the plots before maize was sown, the respective yields of maize grain were 14·1, 13·4 and 12·2 q. per ha. The differences were significant.—W.J.B.

832 JOSEPHSON, L. M. and others. **Popcorn in South Africa.** *Fmg in S. Afr.* 1954, **29,** No. 344, 537-41, illus.

Information is given on the production, culture and use of popcorn in South Africa, and the performance of hybrids in yield trials at Potchefstroom 1952-3.—M.P.

833 POPOW, G. Popcorn. [**Popcorn.**] *Mitt. schweiz. Landw.* 1954, **2,** No. 12, 197-203, bibl. 2, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon, Switzerland]

Varieties of popcorn (*Zea mays everta*) suitable for Tessin are: in favourable situations, the yellow-grained, medium-late hybrids Kansas 4 and Purdue 31, 32 or 38; and in other situations, the yellow-grained medium-early Jopop 5 and 6. In favourable situations north of the alps early varieties only, such as Minnesota Hybrid 250, Japanese Mushroom and Heinrichs Mais can be grown. These are white-grained varieties grown for home-consumption only, since they are not accepted on the Swiss market.—D.B.

834 JUGENHEIMER, R. W. and SILOW, R. A. **Results of co-operative hybrid maize tests in European and Mediterranean countries 1952. A progress report.** *Devel. Pap. 42. FAO* 1954, pp. 179.

Data are given of the relative maturity, designation and pedigree of US and Canadian hybrids tested, the results of regional tests of US and Canadian hybrids, a summary of the results of tests in 1952 by countries, and the results of regional tests of European three-way crosses.—P.J.B.

835 GRILLOT, G. Notes sur le maïs hybrides. [**Notes on maize hybrids.**] *Terre maroc.* 1955, No. 303, 41-2.

Results of trials with maize hybrids, grown with and without irrigation, in French Morocco are discussed briefly.—M.P.

836 JOSEPHSON, L. M. and others. **Results of maize variety trials, Highveld region 1953-1954.** *Fmg in S. Afr.* 1955, **30,** No. 346, 27-31, illus.

The yields of numerous maize varieties and hybrids tested at several localities in the Transvaal and Orange Free State are given. In small plot trials the hybrids outyielded the varieties by an average of 24%, P3158, P4037 Y and P4016 AY were best. In morgen plot trials [1 morgen = 2·116 ac.], erratic spacing resulted in differences of plant population and variable yields, but the hybrids maintained their superiority over the varieties. The yield from second-generation seed was 25% below that from first-generation or top-cross seed.—M.P.

837 KLINGMAN, G. C. and DAVIS, J. C. **Ammonium nitrate solution, 2,4-D, dinitro, and "Dupont M" for weed control in corn.** *Proc. 7th South. Weed. Conf. 1954* 167-73, bibl. 3. [N. Carolina Agric. Exp. Sta., Raleigh]

The results are given of trials at 3 locations in N. Carolina, in which the following treatments were given to maize: pre-emergence treatments with low-volatile ester of 2,4-D and Dupont M (1-(3,4,-dichlorophenyl) - 3 methyl urea), post-emergence treatments with DNOSBP plants 4 in. high and post-emergence treatments with either ammonium nitrate solution plus 2,4-D low-volatile ester, with, or without, a wetting agent. The ammonium nitrate solution was applied at both 5 and 7 weeks after sowing, at a rate of 40 lb. N per ac. as a solution made up of 2·25 lb. ammonium nitrate per gal. water. Where 2,4-D (low volatile ester) was used with the N spray, it was applied at a rate of 0·125 lb. per ac. The ammonium nitrate plus wetting agent solution, without 2,4-D, gave very effective weed control. This treatment was applied as a directed spray to the base of the maize plants and to the weeds in the row. The average grain yield where solid ammonium nitrate at a rate of 80 lb. per ac. was applied when the plants were 20 in. high was 101 bu. per ac., compared with 112 bu. per ac. where the two 40 lb. per ac. ammonium nitrate solutions were applied. The use of 2,4-D as an additive to the ammonium nitrate solutions gave improved control of broad-leaved weeds and inhibited the growth of such perennial weeds as *Solanum carolinense, Campsis radicans* and *Cynodon dactylon.* Dupont M gave a similar degree of weed control to 2,4-D, but its residual effect lasted for 5-8 weeks, compared with 4 weeks for 2,4-D. The DNOSBP treatment injured the maize and was ineffective against weeds. The degree of weed control following the pre-emergence 2,4-D and Dupont M treatments was similar to that following the post-emergence N solution treatments.—P.J.B.

838 WEAVER, H. L. **A comparative study of procambium initiation in hybrid and inbred maize.** *Amer. J. Bot.* 1955, **42,** No. 2, 105-8, bibl. 17. [Univ. Nebraska, Lincoln]

As a contribution to the study of hybrid vigour, the position of initiation of procambium in the shoot apex was examined in 10 common maize inbreds of diverse origin and 39 single-cross hybrids from these inbreds. Since, in these experiments, the level of initiation of procambium was not a factor in hybrid vigour "the results support Ashby's statement that experimental evidence is still lacking for the supposition that hybrid vigour speeds up all life processes."—D.B.

839 DIOS VIDAL, R. and HERRERA, J. M. Análisis foliar 2. El concepto de diagnosis foliar aplicado al control bioquímico de la nutrición de maíz y patatas en una edad fisiologica determinada. [**Foliar analysis. 2. The concept of foliar diagnosis applied to the biochemical control of the nutrition of maize and potatoes at a definite physiological age.**] *An. Edafol. Fisiol. veg.* 1954, **13,** No. 7-8, 559-600, bibl. 40, illus., English summary pp. 597-8. [Misión Biol. de Galicia, Pontevedra, Spain]

An attempt was made to correlate the nutritional status of the leaves of maize and potato, as revealed by foliar analysis, with the plant-nutrient status of the soil when untreated and when supplied with farm-yard manure, N, P and K in various combinations.—W.J.B.

840 DIOS, R. Experiencias con fertilizantes en suelos Gallegos. 1. Acción combinada de los fertilizantes orgánicos y minerales sobre la producción y el contenido en proteína de maíces híbridos. [**Experiments with fertilizers on Galician soils. 1. Combined action of organic and mineral fertilizers on the yield of maize and the protein content of the maize grain.**] *An. Edafol. Fisiol. veg.* 1954, **13,** No. 12, 865-91, bibl. 11, illus., English summary p. 890.

In 1951-3 experiments were carried out in Gallicia, Spain, in which hybrid maize was grown on soil to which NPK (as mineral fertilizers) and farm-yard manure were added at various rates and in various combinations. The effect of the fertilizers on the yields of maize grain and the content of crude protein in the grain was determined. In general, the maximum yields were obtained when

30 kg. K_2O, 39 kg. P_2O_5 and 165 kg. N were applied per ha. in addition to farm-yard manure. Provided that sufficient P and K was added to permit maximum yields, the protein content of the grain increased with increasing applications of N ; at the maximum application of N (220 kg. per ha.), with addition of P and K, the average protein content of maize grain was 10·64% in 1952 and 11·38% in 1953. The protein content of the untreated controls was 9·52 and 9·38% in 1952 and 1953, respectively.—W.J.B.

841 LAIRD, R. J. and others. Fertilizantes y practicas para la producción del maíz en la parte central de Mexico. [**The influence of fertilizers and cultivation practices in the production of maize in central Mexico.**] *Foll Tech. 13. Sec. Agric. Gan. Mexico* 1954, pp. 64, bibl. 15, illus., English summary pp. 63-4.

The response of maize yields to varying rates of application of artificial fertilizers was studied in 13 states of central Mexico in 1945-52. The response of maize yields to fertilizer applications over a range of plant populations and climatic conditions was also studied. The results of the experiments are summarized below. There were significant responses to N, P and K in 73·4%, 35·6% and 2·3% of the experiments, respectively. The average increase in yield of grain in response to 40 kg. N per ha. was 0·52 m. tons per ha. ; the average increase from 40 kg. P_2O_5 was 0·24 m. ton per ha. In experiments in 1951-2, in which a basic dressing of 40 kg. P_2O_5 was given, increases in grain yields of 0.71, 1·04, 1·39 and 1·41 m. tons per ha. (compared with plots receiving no N) were obtained by the use of 24, 40, 60, and 80 kg. N per ha. In general, the optimum plant population increased with increasing rates of fertilization and with increasing natural fertility of the soils. In the Toluca Valley the optimum population varied from 60 thousand plants per ha. without fertilizers to 80 thousand plants per ha. where 80 kg. N and 80 kg. P_2O_5 were added to the soil. In Guanajuato (where natural soil-fertility is lower) the optimum plant population was about 45 thousand plants at all levels of N and P fertilization. It was noted that the response of yields to fertilizer applications in irrigated regions and regions of relatively high rainfall was greater than in the relatively dry regions. Recommendations for applications of N, P and K are given for each state of central Mexico. —W.J.B.

842 VIETS, F. G. and others. **The relationships among corn yields, leaf composition and fertilizers applied.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 3, 297-301, bibl. 8. [Irrigation Exp. Sta., Prosser, Wash.]

The results are given of 3 experiments, using hybrid Iowa 939 maize grown in central Washington under irrigation. Determinations were made of the total N, P, Ca, Mg, K and Mn content and the content of P soluble in 2% acetic acid of the leaves at several growth stages, and, in particular, of the second leaf below the ear at the time of silking. Only applied N increased grain yields significantly, while P and K treatments did not. The total N content of leaves selected prior to silking gave lower correlations with yield than that of leaves sampled at silking. Yields were highly positively correlated with both total N and total P contents of leaves sampled at silking and there was a high degree of correlation between total N and P contents. The minimum leaf N content associated with no evidence of leaf-tip burn was far below that reported as the critical content associated with maximum grain yields.—From authors' summary.

SWEET-CORN

843 TORFASON, W. E. and NONNECKE, I. L. **A study of the effects of temperature and other factors upon the germination of vegetable crops. 1. Sweet corn.** *Canad. J. agric. Sci.* 1954, **34,** No. 2, 137-44, bibl. 9. [Domn. Agric. Exp. Sta., Lethbridge, Alta]

Sweet-corn seed was germinated in the greenhouse under a number of different conditions during 2 years' trials, including the following : temperatures of 1·7, 5, 10, 15 and 18·3°C. and 3 different soil media, namely, Lethbridge, brown silt loam, Malmo silty clay loam (Parkland black loam) and Vermiculite. Varieties used included Altagold, Dorinny and Golden Early Market (open pollinated) and the hybrid Carmelcross. The seed was exposed to the above temperatures and in the above media for 10, 20 and 30 days. After exposure to the different germinating procedures, the seedlings were transferred to the field, or kept in the greenhouse. Temperatures below 10°C. resulted in significant reductions in germination, compared with temperatures of 15°C., or more. Germination at the lowest temperature used did not differ significantly from that at 10°C. Where the germinating medium was Vermiculite, the germination at each temperature differed significantly from that at the other temperatures. In both trial years, particularly at low temperatures, the germination in Vermiculite was significantly higher than that in the two soils, which did not differ significantly from each other in this respect. Germination at 15°C. or 18·3°C. was only slightly affected by time of exposure ; at low temperatures, germination decreased markedly as time of exposure increased. All 4 varieties reacted similarly to the different temperature treatments.—P.J.B.

844 GUZMAN, V. L. and WOLF, E. A. **Weed**

control investigations in vegetable crops. *Rep. Univ. Fla agric. Exp. Sta. 1953* [n.d.], 249-54.

In trials on peat and muck soils in S. Florida, pre-emergence treatments of sweet-corn with 12 lb. DNSOBP or 2 lb. CMU per ac. gave excellent weed control for almost the whole of the growing season. Results where 2 lb. 2,4-D per ac. were applied were unsatisfactory. In post-emergence treatments using 2,4-D and NIX, yields did not differ significantly from untreated controls. One lb. of 2,4-D amine per ac. was applied when the crop was knee-high, and, in a second trial, 0·75 lb. of 2,4-D amine was applied at the time of silking. The herbicides were directed to the basal parts of the plants. In all cases, 2,4-D treatments resulted in more uniform ear quality and 2 days earlier maturation, compared with controls. 2,4-D treatments gave better weed control than NIX (applied at 10 lb. in 90 gal. spray volume per ac.). In trials in which 0·75 lb. 2,4-D amine per ac. was applied to 4 sweet-corn varieties at different growth stages, treatments made when the plants were 6 in. high resulted in marked yield decreases ; treatments at the 4-6 in. high stage caused slightly smaller yield decreases. Directed applications (to the stem bases) when the plants were over 12 in. high caused no injury. The varieties differed in susceptibility to damage. Pre-emergence treatments with 2 lb. MCPA per ac. gave excellent weed control ; sweet-corn plants were slightly injured at emergence, but no significant yield reductions ensued.—P.J.B.

SORGHUM

845 BASINSKI, J. J. **Witchweed and soil fertility.** *Nature, Lond.* 1955, **175,** No. 4453, 431, bibl. 2. [South. Devel. Invest. Team, Malakal, Sudan]

Following the work of Jones [*Fld Crop Abstr.* 7 : 84 and 275], subsequent investigations have led to the following conclusions : (i) infestation by *Striga hermonthica* assumes considerable importance as a factor controlling crop yields in areas where sites suitable for cultivation, as well as the range of suitable crops, are limited ; (ii) on inherently fertile, heavy soils, damage due to this parasite reaches the critical level before the appearance of signs of soil exhaustion ; (iii) *Striga* is only one of the evils of intensive and prolonged monocropping. Its control, for example by selective herbicides, can provide only a partial solution to the problem of deterioration in sorghum yield. Though soil erosion is generally not serious on the clay plains in the southern Sudan, *Striga* undoubtedly plays an important part in soil conservation, being one of the factors necessitating shifting cultivation. The introduction of an easy method of eradication might, in those areas, lead to over-cultivation and accelerated erosion, which would cause much greater and more permanent damage than the parasite itself.—M.H.

846 TARR, S. A. J. **Protection of sorghum against soil fungi, soil pests and covered smut by combined insecticide-fungicide seed dressings.** *Ann. appl. Biol.* 1954, **41,** No. 4, 578-85, bibl. 3. [Res. Div., Minist. Agric., Sudan]

Treatment of sorghum (*Sorghum vulgare*) seed with fungicide dressings controlled covered smut (*Sphacelotheca sorghi*), the major disease of sorghum in the Sudan, and usually resulted in appreciably better stands. In the Sudan Gezira, powder dressings containing 20-40% γ-benzene hexachloride (γ-BHC) applied at the rate of 1 g./lb. of seed effectively protected roots of sorghum seedlings from attack by chafer grubs (*Schizonycha* sp.) and significantly increased stands and yields. No certain evidence of this effect was obtained with dolichos bean (*Dolichos lablab*) or groundnut (*Arachis hypogaea*), and the different responses shown by these plants as compared with sorghum are attributed largely to differences in seed germination and root system. An application rate of 0·08% γ-BHC/seed was sometimes slightly but appreciably phytotoxic to sorghum in the field and more markedly so in greenhouse experiments. A powder containing 25% Thiram and 20% γ-BHC applied at the rate of 1 g./lb. of seed is recommended as the standard seed dressing for sorghum in the Sudan.—Author's summary.

847 GORTER, G. J. M. A. **Kernel smut of kaffir-corn.** *Fmg in S. Afr.* 1954, **29,** No. 343, 494 and 502, illus.

This disease of sorghum, caused by *Sphacelotheca sorghi*, can be controlled by sowing smut-free seed or growing resistant varieties. The use of mercurial, copper or non-metallic dry seed-dressings at the rate of 4 oz. per 100 lb. of seed satisfactorily controls the disease and affords further protection to the developing seedlings. The use of finely ground flowers of sulphur, though effective, provides no further protection. Infection trials at Potchefstroom, with locally grown varieties of grain sorghum, showed Hegari to be entirely immune, Martin and Jordaan White were fairly resistant, but Radar, Birdproof and Red-Mix were susceptible. The American varieties Yellow Milo, Pierce Kaferita and a Kafir × Kaferita cross were immune.—M.P.

848 PASCHAL, J. L. and EVANS, C. E. **Economic interpretations of yield data from a nitrogen rate experiment with irrigated grain sorghum.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 4, 454-8. [Prod. Econ. Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

In trials in 1951 at Tucumcari, New Mexico, Plainsman sorghum was grown on newly-cleared land under the following irrigation, manurial and plant spacing treatments : (a) soil-moisture tension at a depth of 9 in. maintained below 0·7 atmospheres during season, (b) soil-moisture tension allowed to reach 12-15 atm., except at heading, when it was maintained below 0·7 atm., (c) plants spaced at 4 in. apart in the row, in rows 36 in. apart (43,560 plants per ac.), (d) plants 9 in. apart in rows 36 in. apart (20,028 plants per ac.), (e) 80 lb. P_2O_5 per ac., (f) 60 lb. N + 80 lb. P_2O_5, (g) 120 lb. N + 180 lb. P_2O_5, (h) 240 lb. N + 280 lb. P_2O_5 per ac. The manures were placed 3 in. deep and 3 in. to the side of the rows immediately after sowing. Highest yields were obtained where moisture treatment (a) was combined with plant-spacing treatment (c) ; where manurial treatments (e), (f), (g) and (h) were combined with these moisture and plant-spacing treatments, grain yields were 44·6, 73·6 89 and 102 bu. per ac., respectively. Where plant-spacing (d) was used, with all other manurial treatments as before, yields were 44, 65·4, 65 and 83 bu. per ac., respectively. Where the price of sorghum was $1·12 per bu. and the price of N 15 cents per lb., 152 lb. N per ac. was most profitable, when combined with treatments (a) and (c). Combined with treatments (a) and (d), 131 lb. N per ac. was most profitable. Where treatment (a) was combined with plant populations (c) and (d), the most profitable rates of N treatment were 89 and 75 lb. per ac., respectively. Using the most profitable rates of N treatment as given above, treatments (a) + (c), (a) + (d), (b) + (c) and (b) + (d) gave the following returns in terms of grain-yield increase minus cost of applied N : 32·60, 11·08, 14·78 and 18·68$, respectively. Changes in profitability consequent on differences in the price of sorghum grain or N are discussed.—P.J.B.

RICE

849 AARTSEN, J. P. van. **Geographic aspects of rice growing.** *Tijdschr. Econ. Soc. Geogr.* 1954, **45,** No. 3-4, 57-65.

A critical review is made of the methods of growing rice in the chief rice-growing areas of the world. Special attention is paid to India, China and Indonesia and to the contrast between the methods used in the first two countries.—W.J.B.

850 CÉPÈDE, M. Le riz dans le monde, en Europe et en France. [**Rice in the world, in Europe and France.**] *Riz et Rizicult.* 1955, **1,** No. 1, 5-10.

851 COYAUD, Y. and others. Le riz aux États-Unis. Rapport de mission 1951. [**Rice in the USA. Report of a mission, 1951.**] *Bull. agron. 10. Fr. d'out. mer.* 1954, pp. 304, bibl. in text, illus.

852 REYNOLDS, E. B. **Research on rice production in Texas.** *Bull. 775. Texas agric. Exp. Sta.* 1954, pp. 29, bibl. 52, illus.

The results are presented of studies on rice production carried out during the past decade at the Rice-Pasture Experiment Station, Beaumont. These studies have included the following : climatic, soil and water requirements of rice, cropping systems, seedbed preparation, varieties and types of rice, sowing methods, manurial treatments, irrigation, drainage, insect pests and diseases, weed control, harvesting, drying and storage. In cropping-system studies, yields of rice following alyce clover [*Alysicarpus vaginalis*] ranged from 2500-2860 lb. per ac., compared with 1800 lb. per ac. where rice did not follow this clover. It was practicable to convert from rice cropping to pasture by broadcasting grass and clover seed, with no seedbed preparation, in standing rice after the final draining, 10 days before harvesting ; sowings between 15 October and 1 December gave the best results. In varietal trials during 1948-53, Century Patna gave the highest yields among 7 early-maturing varieties, with 3361 lb. per ac., followed by Calrose, with 3343 lb. per ac. Of mid-season varieties, RN, Improved Bluebonnet, Bluebonnet and Fortuna gave the highest yields. Of late varieties, R-D, a scented variety, gave a mean yield of 3468 lb. per ac. The other late varieties, Texas Patna, TP49 and Rexoro gave somewhat lower yields than the early- and late-maturing varieties. In comparisons of yields following drilling and broadcasting of seed, broadcasting resulted in mean yields of 4871 lb. per ac. rough rice, compared with 4518 lb. for drilled crops. In sowing-date trials, yields of early-maturing varieties were little affected by sowing in March or in June. Yields of mid-season and late varieties declined markedly as sowing dates progressed from 17 March to 13 June. In combined sowing rate + manurial treatment trials, yields did not differ significantly between sowing rates of 90, 135 and 180 lb. per ac. On Lake Charles clay, Lake Charles clay loam and Beaumont clay, applications of 80 lb. N + 40 lb. P_2O_5 per ac. were recommended and on Katy fine sandy loam, 40 lb. N + 40 lb. P_2O_5 + 20 lb. K_2O per ac. On weed-free land where early or mid-season varieties were grown, all the manure could be effectively applied at sowing, or up to 40 days after sowing, with little difference in yield. Where the land was weed-infested, or late varieties were grown, manures were best applied 30-40 days after sowing. In irrigation experiments, yields differed little where 2, 5, or 8 in. submergence was used and the fields drained once during the season ; it appeared

that the use of 45-50 ac. in. of water would give yields as high as those where larger amounts were used.—P.J.B.

853 ELLEGALA, H. P. B. **Mechanized preparatory tillage of paddy land at Hingurakgoda Farm [Ceylon].** *Trop. Agriculturist* 1954, **110,** No. 2, 88-91, illus.

The puddling and levelling of irrigated rice-fields by mechanical means is described, with special reference to a chisel-type harrow (for puddling) and a levelling board designed by the author. In the area referred to, the following conditions, which make tractor cultivation possible, generally obtain : (1) there is water available for flooding (to prevent tyre-slip) during the puddling and levelling operations, (2) the depth of mud does not exceed 1·5-2 ft., (3) the sub-soil is either gravel or sand, so permitting tyres to grip. On the farm mentioned the cost of mechanical preparation of rice fields is one-quarter the cost of preparation when using animals.—W.J.B.

854 TINARELLI, A. Le razze di riso e l'ambiente ecologico. [**Rice varieties and environment.**] *Riso* 1955, **4,** No. 3, 16-18, bibl. 4.

It has been stated that the growing of the rice variety Pierrot is not justified from a commercial standpoint. However, Pierrot, which is early and hardy, is suited to the "baraggia" soils of the northern part of the Vercelli Province, on which it is grown. These soils are acid, compact, clay, low in calcium content. The temperature of this region is lower, and the rainfall higher, than in the southern part of the Province.—E.B.O.

855 PIACCO, R. Sperimentazione su risi americani. [**Trials with American rice varieties (in Italy).**] *Riso* 1955, **4,** No. 2, 13-15, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

856 DE BENI, U. Il "Balilla" a grana grossa. [**Balilla Large Grain.**] *Riso* 1955, **4,** No. 2, 22-4, illus. [Produttori Sementi, Bologna, Italy]

The rice variety Balilla Large Grain, selected from Balilla, is medium-early having a vegetative cycle of 170 days, and is 95 cm. high. It is high-yielding when grown at a high plant-density, is highly resistant to lodging and resistant to "brusone" (*Piricularia* sp.). Its grain is larger than that of Balilla, the weight of 1000 seeds being 26·78 g., but the yield of the 2 varieties is similar. In a field experiment the yields of Balilla Large Grain and Balilla were 10,969 and 10,949 kg. per ha., respectively.—E.B.O.

857 RICE JOURNAL. **Toro, new variety, is leader in Louisiana yield tests.** *Rice J.* 1954, **57,** No. 12, 14.

A note is given on Toro, a new rice variety derived from a Bluebonnet × (Rexoro × Blue Rose) cross. In trials in Louisiana during 1952-4, average yields of Toro, Sunbonnet, Bluebonnet and Bluebonnet 50 were 20·7, 17·5, 17·5 and 16·9 barrels [1 barrel = 162 lb.] per ac., respectively. Toro is a mid-season long-grained, short-strawed variety, with high milling quality.—P.J.B.

858 BOLLICH, C. N. and WALKER, R. K. **Venezuelan irrigated and upland rice variety tests —1953.** *Publ IBEC Res. Inst.* 1954, pp. 14.

The tests reported were carried out on Palo Gordo heavy soil near Acarigua, Venezuela, with 14 varieties introduced from the USA. On irrigated plots, rice was sown on 9 May and top-dressed on 27 May with 85 kg. per ha. of 12-12-12 (NPK). The non-irrigated (upland) plots were sown on 3 May and received no manure. Under irrigated conditions highest yields were given by Lacrosse, Rexoro Purple Leaf × Guidry and Bluebonnet, with 7253, 7215 and 6812 kg. grain per ha., respectively. Under upland conditions, highest yields were given by Century 231, Rexoro Purple Leaf × Magnolia and Zenith, with 4702, 4553 and 4441 kg. per ha., respectively. Yield increases of the irrigated over the upland rice ranged from 4·5 to 82·3%, which was thought to be due both to irrigation and to close spacing on the irrigated plots. Under irrigation, only Texas Patna lodged severely ; under upland conditions, Bluebonnet, Bluebonnet 50, Bluebonnet 50 (Texas) and Sunbonnet lodged severely. Under irrigation, the lowest incidence of brusone (*Piricularia oryzae*) occurred in the Bluebonnet varieties ; late-maturing varieties had the greatest incidence of this disease. Under upland conditions, the early varieties Lacrosse, Rexoro Purple Leaf × Magnolia, Zenith and Century 231 had the lowest incidence of brusone. There was a more even maturation on irrigated than on upland plots. On the basis of these results, the varieties Lacrosse and Rexoro Purple Leaf × Magnolia appeared to offer most promise for conditions in Venezuela, even though they do not possess the long-grained character currently preferred there. —P.J.B.

859 PIACCO, R. Le erbe infestanti nelle risaie italiane. [**Weeds in Italian rice-fields.**] *Ital. agric.* 1955, **92,** No. 2, 88-95, bibl. 4, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

The principal weed species in Italian rice-fields are *Panicum crus-galli, P. phyllopogon, Alopecurus geniculatus* of the Gramineae ; *Scirpus mucronatus, S. maritimus, Butomus umbellatus, Eleocharis solonensis* of the Cyperaceae ; *Alisma plantago* and several species of algae. The various methods of control practised in Italy, or recommended by other authors, are described and their relative merits are discussed. A preventive measure is the

avoidance of weed-seed dissemination through irrigation water, manure and seed. The principal direct methods of control are : (a) mechanical or chemical treatment of the soil before sowing and after the fields have been flooded to encourage the growth of weeds ; (b) mechanical treatments of weed-infested soils before transplanting rice ; (c) management of the irrigation water to maintain a high level of water at suitable times ; (d) hand-weeding, mechanical weeding or use of selective herbicides after sowing. Hand-weeding is the principal method, while there is still uncertainty in the use of selective herbicides. It is concluded that the success with a particular method of weed control is largely dependent on the conditions under which it is used.—E.B.O.

860 FINFROCK, D. C. **Weed control experiments at the Rice Experiment Station at Biggs.** *Proc. 6th Ann. Calif. Weed Conf. 1954* 26-8. [Rice Exp. Sta., Biggs, Calif.]

In trials to determine the effect of time of treatment with 2,4-D on yields of lowland rice, applications of 22 oz. 2,4-D acid equivalent per ac. (formulation not given) were made at weekly intervals from 45 to 94 days after sowing. The results showed that best control of weeds and highest yields of rice followed treatment at 50-60 days after sowing. Early treatments when water on the plots was 6 in. deep and weeds had not emerged, resulted in poor rice yields, as also did treatment at 75-85 days after sowing. In further trials, comparisons were made of 2,4-D and MCPA as herbicides for rice. Formulations used were MCPA amine and Na salts, 2,4-D amine and Na salts, and a dry amine formulation of 2,4-D, all applied at a rate of 1·5 lb. a.e. per ac. in 12·5 gal. spray volume per ac. The herbicides were applied on 16 July, 56 days after sowing and maximum temperatures at this time ranged from 94-97°F. Only moderate weed populations were present. There was no significant difference between any materials in their effect on rice yields. Apparent damage recorded at 4 weeks after treatment was not correlated with yields.—P.J.B.

861 CHEREWICK, W. J. **Studies on seed-borne microflora and the effect of seed treatment on rice.** *Malay. agric. J.* 1954, **37,** No. 3, 169-72, illus.

In a preliminary study of rice seed of several varieties from Kedah, the percentage of rice seed contaminated with various fungi was determined and the effect of seed-dressing with Agrosan at the rate of 1·5 oz. per bu. was assessed. Seed samples were found to be 15-100% contaminated (average 55%). Surface sterilization of this seed with 0·1% mercuric chloride solution reduced contamination by about 33%. Among the organisms found on the seeds were *Helminthosporium oryzae, Cercospora oryzae, Piricularia oryzae* and *Nigrospora* spp. The seed (which was either 3-6 or 8 months old) treated with Agrosan was sown in pots, and, in one case, in the field. After the seedlings had reached the second- or third-leaf stage they were removed from the soil and classified as healthy or diseased. In the case of most of the varieties tested, there was over 90% germination of untreated seed. The percentage of diseased seedlings, obtained from treated seed, was less than 5% in the case of most varieties. The treatment approximately doubled the stand of rice seedlings in the field. In the case of untreated seed the percentage of diseased seedlings varied from 3 to 75% and was frequently of the order of 20-30%. Treatment thus significantly reduced the incidence of disease in seedlings.—W.J.B.

862 VENKATACHALAM, S. **The intake of silica by the rice plant with reference to blast disease.** *Madras agric. J.* 1954, **41,** No. 9, 304-10, bibl. 9. [Agric. Coll. and Res. Inst. Coimbatore]

An attempt was made to discover whether there is a positive correlation between silica content in rice plants and varietal resistance to blast (*Piricularia oryzae*). The silica content of the leaf, stem, panicle and root of plants of the varieties Coimbatore 4 (resistant to blast) and Aduthurai 10 (susceptible to blast) was determined at various stages of growth. In general, the various plant parts of the resistant variety contained no more silica than did those of the susceptible variety. The resistant variety, however, showed a greater intake of silica into the leaves during the vegetative stage than did the susceptible variety. In the period plant-maturity to flowering there was a greater intake of silica into the stems of Coimbatore 4 than into those of Aduthurai 10. Thus at the times when the leaf and stem, respectively, were most susceptible to attack, they absorbed more silica in the resistant than in the susceptible variety.—W.J.B.

863 SUETSUGU, Y. **Developmental morphology of the embryo in rice varieties.** *Bull. nat. Inst. agric. Sci. Ser. D* 1953, No. 4, 23-52, bibl. 53, illus.

864 NONAKA, F. **Biochemical changes of the lower parts of rice stems whose leaf blades were cut off at different stages of growth. (Part 1) Biochemical changes of the lower parts of rice stems at different stages of growth.** [Japanese] *Sci. Bull. Fac. Agric., Kyushu* 1955, **15,** No. 1, 1-5, English summary p. 5.

865 NONAKA, F. **Relation between the leaf-cutting of rice plant at different stages of**

growth and the severity of stem rot, nitrogen and carbohydrate contents of the lower parts of the treated rice stems. [Japanese] *Sci. Bull. Fac. Agric., Kyushu* 1955, **15,** No. 1, 7-14, English summary p. 14.

866 STROMBERG, L. K. and YAMADA, H. **Water quality in rice fields. Studies of possible causes of poor rice stands indicate level of total salts content of water influences growth and yield.** *Calif. Agric.* 1955, **9,** No. 3, 10.

A study was made of factors causing the death of lowland rice stands over an area of several hundred acres in Fresno County, California. The plants grew normally for about 25 days after sowing and then died in a period of 5-7 days. The total salt content of the irrigation water was found to be responsible for stand deaths. From data taken from field and laboratory studies, a graph is given showing the relation between rice growth and total salt content of the irrigation water and percentage of Na in the total salt content.—P.J.B.

867 KALOYEREAS, S. A. **A gas storage for preserving rough rice.** *Rice J.* 1955, **58,** No. 2, 40-2, bibl. 6, illus. [Louisiana State Univ.]

In preliminary trials, rough rice could be stored for 3 months in air containing 50% CO_2, with no deterioration. Rice similarly stored in a normal atmosphere was totally spoiled. In further trials, rough rice (20·8% moisture content) was stored in air containing not more than 30% CO_2 and 1000 ppm. ethylene oxide. After 6 months' storage at room temperature, the rice was still in good condition and no mould had developed. The acid number of the oil of rice stored in CO_2 + ethylene oxide was slightly higher than that of rice stored in 50% CO_2. The possibilities of using gas storage of rough rice to lengthen the permissible period between harvesting and drying are noted.—P.J.B.

868 KESTER, E. B. and others. **Comparison of aeration, turning, and flat storage as a means of maintaining quality of western-grown rice.** *Rice J.* 1955, **58,** No. 4, 12-16. [West. Util. Res. Br., Agric. Res. Serv., U.S. Dep. Agric., Albany 10, Calif.]

A brief report is given of the results of trials on the storage of rough rice with moisture contents of 11, 13·5 and 15·6%. In one set of storage bins, the grain was untouched, in a second, the rice was aerated at a rate of 1·27 cu. ft. per min. per bu., and in a third, the rice was turned. All samples remained in good condition during the first six months of storage. At the 7th month (1 June) the untouched rice had begun to deteriorate in quality, whereas that subjected to aeration and turning treatments remained in good condition for two additional months, despite grain temperatures of up to 95°F. It appeared that rice with 15% moisture content was more stable during storage, provided that it was turned or aerated once per month, than that with 11% moisture content, stored undisturbed. The germination of aerated or turned rice was unaffected by storage for 7 months ; rice with 15% moisture content, stored under these conditions, had a germination percentage below 80 after storage for 9 months. From these results, it was concluded that the effect of aeration or turning may be more important than moisture content in maintaining the quality of rice during storage.—P.J.B.

869 SCHUSTER, W. H. **Fish culture in conjunction with rice cultivation. 2.** *World Crops* 1955, **7,** No. 2, 67-70, illus. [F.A.O.]

Methods of stocking irrigated rice fields with fish are described and the effects of fish culture on the rice crops are discussed. Since a minimum depth of 10 cm. water is required for fish, they cannot be kept in rice fields where varieties preferring shallower water are grown. It is possible for fish to disturb freshly transplanted seedlings, but the difficulty can be avoided by delaying stocking until 5-10 days after transplanting. Fields which have to be drained from time to time (to control stem-rot or other diseases), cannot be stocked with fish. It is claimed that fish reduce the incidence of certain insects occurring in irrigated rice fields, notably rice stem-borers and malaria-carrying *Anopheles*.—W.J.B.

GENERAL

870 FLANDRIN, F. La production des semences de céréales par les Coopératives. [**Cereal seed production by the Co-operatives.**] *Bull. tech. Inform.* 1955, **96,** 41-53, illus.

The important role of the co-operatives in France in encouraging the production and distribution of high-grade seeds of cereal varieties suitable to their particular area is stressed. Details are given of the administrative, practical, technical and economic conditions to be fulfilled by such organizations, with advice on the layout of the buildings and the selection of suitable machinery in relation to output.—M.P.

871 MESA, D. El 2,3,5 trifenil cloruro tetrasódico en la determinación de la germinabilidad de las semillas. [**2,3,5-triphenyl tetrazolium chloride in the determination of seed germinability.**] *Inform. Tec., Bogota* 1954, **1,** No. 2, 79-129, bibl. 112.

The literature on the determination of viability in seeds by means other than direct germination tests is reviewed. Experiments on wheat, barley, oats and maize are described in which the results obtained by normal germination tests were compared

with those using Terazol (containing 2,3,5-triphenyl tetrazolium chloride). Terazol solutions at concentrations of 2% (as recommended by the manufacturers) were applied to groups of whole and longitudinally halved grain of wheat, barley, oats and maize for periods of 24 hr. in the case of the whole grain and 3-4 hr. in the case of halved grain. The grain was soaked in water for 16 hr. before treatment with the chemical. In the case of maize, an additional test was made in which the solution was applied to excised embryos, following Lakon's method. When halved grain was used, the percentage viability of wheat, oats and barley, as assessed from the percentage of embryos stained by 2% Terazol solution, coincided fairly closely with the results obtained by the usual germination tests. Halving the grain gave more consistent results than using whole grain and facilitated the observation of staining. Concentrations of less than 2% Terazol in solutions gave unsatisfactory results. In the case of maize the results obtained with Terazol indicated a higher degree of viability than that observed in normal germination tests. In the case of 5 samples, normal germination tests gave germination percentages of 85·5, 90, 91, 83·5 and 87%. The Terazol test gave results for the same samples of 90, 91, 100, 96 and 87%. Practical difficulties were encountered in excizing maize embryos.—W.J.B.

872 England and Wales Ministry of Agriculture and Fisheries. **Application of selective weed-killers to cereals.** *Adv. Leafl. 315. England and Wales Minist. Agric. Fish.* 1955, pp. 8.

873 England Wales Ministry of Agriculture and Fisheries. **Weed control in cereals by selective weed-killers.** *Adv. Leafl. 436. England and Wales Minist. Agric. Fish.* 1955, pp. 7.

874 Ripley, P. O. **Weed control in Western Canada.** *Emp. J. exp. Agric.* 1954, **22,** No. 88, 261-6, bibl. 6. [Exp. Fms Serv., Canada Dep. Agric.]

The weed situation under the grain-farming systems of the prairie provinces of western Canada is summarized and especially the history and development of selective herbicides in weed control. Approximately 12 million ac. of grain in the prairie provinces are sprayed annually with 2,4-D. This represents approximately one-third of the total grain areas of western Canada.—From author's summary.

875 Pätzold, C. Die Vernichtung von Topinamburaufwuchs in Getreidebeständen. [**Destruction of Jerusalem artichoke in cereal stands.**] *Z. Acker- u. Pflbau* 1955, **99,** No. 1, 87-102, bibl. 29, illus. [Forschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

Data on the rate and date of application of several growth-hormone substances, their effectiveness in destroying *Helianthus tuberosus* in cereal fields and the influence of the treatment on yields of spring-wheat, oats, and spring-rye are tabulated. The growth substances were Hedonal, U46, Feinkainit, M52, Tormon and 2,4-D Na. The best time for treatment is from mid- to end-May, when several tubers from each plant have sprouted and reached a height of 30-40 cm. Early sowing of the cereal enables the crop to produce a strong growth before the tubers of *H. tuberosus* have sprouted. The treatment is so successful that *H. tuberosus* can safely be introduced into a rotation.—D.B.

876 Large, E. C. **Growth stages in cereals. Illustration of the Feekes scale.** *Pl. Path.* 1954, **3,** No. 4, 129, bibl. 2, illus. [Pl. Path. Lab., Harpenden, Herts, England]

An illustrated scale, based on that of Feekes, is given for the definition of different growth stages in wheat, rye, barley and oats.—P.J.B.

877 Walkden, H. H. and others. **Control of stored grain insects in the North Central States.** *N. Cent. Reg. Publ. 49. Minn. agric. Exp. Sta.* 1954, pp. 23, illus.

LEGUMES

COWPEAS

878† Crofts, F. C. and Jenkins, H. V. **Root-nodule bacteria for cowpeas on the red basaltic soils of the Richmond River of New South Wales.** *J. Aust. Inst. agric. Sci.* 1954, **20,** No. 4, 257-8. [Univ. Sydney, Lismore, N.S.W.]

Of 3 strains of root-nodule bacteria tested, only one strain, obtained from CSIRO, Brisbane, ex-Queensland Department of Agriculture and Stock and designated R314, was found to be efficient in effectively nodulating cowpeas (*Vigna sinensis*) grown on the red basaltic soils of the Richmond River districts of N.S.W.—Authors' summary.

SOYABEANS

879 Shafer, N. E. **Crop drying chemicals for seed production in Nebraska.** *Down to Earth* 1954, **10,** No. 1, 2-3 [Dep. Agron., Univ. Nebraska, Lincoln]

Recommendations are given for the use of crop drying chemicals on seed crops of lucerne and other forage legumes and on soyabeans. For soyabeans, applications of 2 pt. of DNOSBP, or 4 qt. of 40% PCP, in 5 gal. diesel oil per ac., where weeds are

present, or 1 pt. of DNOSBP, or 2 qt. PCP in 5 gal. diesel oil per ac., where the crop is clean, are recommended. These chemicals have also been successfully used on grain sorghum, but no recommendations are yet considered possible.—P.J.B.

880 HAUSER, E. W. **Absorption of 2,4-dichlorophenoxyacetic acid by soybean and corn [maize] plants.** *Agron J.* 1955, **47,** No. 1, 32-6, bibl. 17. [Iowa Agric. Exp. Sta., Ames]

881 WAREING, P. F. **Experiments on the " light-break " effect in short-day plants.** *Physiol. Plant.* 1954, **7,** No. 1, 157-72, bibl. 17. [Bot. Dep., Univ. Manchester, England]

The results are given of experiments, using Biloxi soyabeans and *Xanthium pennsylvanicum*, to test the validity of two alternative hypotheses, that of Wareing and Carr and that of Bünning, proposed to explain the inhibition of flowering in short-day plants when exposed to light-breaks during very long, dark periods. From the results, it was concluded that the inhibition of flowering in Biloxi soyabeans (in *X. pennsylvanicum* it was almost absent) was due to the interaction between the light-break and the following light period, which resulted in a light period exceeding that under which flowering could occur. Light effects, observed following light-break interruptions at the early part of the dark period (inhibition of flowering) and towards the end of the dark period, were not considered to be due to the presence of an endogenous rhythm of photophile and scotophile phases, as cited in Bünning's hypothesis. Under some conditions, light-breaks made during the middle of the dark period stimulated flowering in the soyabean plants.—P.J.B.

882 BRUN, W.A. **Translocation of the flowering effect in photoperiodically induced plants.** *Diss. Abstr.* 1955, **15,** No. 1, 13-14. [Univ. Illinois]

The results are given of a study of the translocation of the flower-inducing agent in *Xanthium commune* and Biloxi soyabeans.—P.J.B.

883 WEBB, J. R. and others. **The effect of magnesium upon the growth and the phosphorus content of soybean plants.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 4, 458-62, bibl. 10. [Purdue Univ. Agric. Exp. Sta., Lafayette, Ind.]

Evidence was found to support the theory that Mg acted as a carrier of P within the plants.—P.J.B.

GROUNDNUTS

884 BOLHUIS, G. G. La culture de l'arachide en Indonésie. [**Cultivation of the groundnut in Indonesia.**] *Oléagineux* 1955, **10,** No. 3, 157-60, bibl. 11, illus.

This is a brief review of the present situation of the groundnut industry in Indonesia, with particular reference to Java, the chief producer. The oil export from Indonesia has fallen to a very low level and in 1953 was only 6-7 thousand tons, since most of the crop is consumed locally. The varieties grown are of mixed and uncertain origin ; new selections are required.—M.P.

885 TOURTE, R. and FAUCHÉ, J. Précisions sur l'écartement optimum dans la culture de l'arachide et du mil au Sénégal. [**The optimum spacing for groundnut and millet crops in Senegal.**] *Bull. agron. 11. Fr. d'out. mer* 1954, 64-71, bibl. 2. [Cent. Rech. Agron., Bambey, Senegal]

In a second series of trials in 1952-3, in which groundnuts were sown at a density of 80,000 seeds per ha., different spacings were tested. The seed was sown along single rows or twin rows, the distance between twin rows being 10 or 20 cm. The distance between single rows, or between the central lines of a pair of twin rows, was 70, 90 or 110 cm. The seed was sown at different spacings along the rows so that plant density was the same in all plots. Results indicated that differences in yield from single rows and twin rows was insignificant, and that yields were highest with the lowest distance, 70 cm., between single rows, or pair of twin rows. It was also found that in regions of high rainfall the yield from groundnuts grown on ridges was 21% higher than when grown on the flat. [See also *Fld Crop Abstr.* 6 : 978.] Trials were also carried out in 1953 to study spacing and seed density with millet (*Pennisetum* sp.) var. Sanio 165 and sorghum var. Congossane. Trials with sorghum were inconclusive. Results from the first year's trials with millet indicated that sowing in twin rows at a spacing of 34 cm. along the row, the distance between twin rows being 40 cm. with 3 m. between the central lines of a pair of twin rows (corresponding to a density of 20,000 stands per ha.), was promising for mechanized cultivation.—E.B.O.

886 SESHADRI, C. R. **Groundnut rotation experiment.** *Madras agric. J.* 1954, **41,** No. 8, 249-54, bibl. 5.

An experiment in 1945-51 is described in which the following rotations were used : (a) *Pennisetum typhoides*/groundnut, (b) *Sorghum vulgare*/groundnut, (c) *Paspalum scrobiculatum*/groundnut. Plots were also continuously cropped with groundnut and with each of the cereals mentioned. There were increases, but no significant increases, in groundnut yields in (a), (b) and (c) compared with those obtained by continuous cropping with groundnut.

There were significant increases in the yields of all cereals (except in the case of *P. scrobiculatum* following the runner type of groundnut) varying from 43 to 124% compared with those obtained from continuously cropped cereals. Sorghum appeared to derive more benefit than other cereals from being grown in rotation with groundnuts. From the economic point of view the sorghum/groundnut rotation was the most profitable.—W.J.B.

887 TIMMS, A. V. **Peanuts. Promising crop for the Bourke district [N.S.W.].** *Agric. Gaz. N.S.W.* 1954, **65,** No. 9, 472-4, illus.

Trials were carried out in the Bourke district with the varieties Standard Valencia and Maclean Valencia from November, 1953 to March, 1954. Water was applied by trench irrigation, weekly, throughout the growing season. In January, 2 cwt. of superphosphate per ac. were applied. No disease was apparent on either variety. Standard Valencia yielded 2000 lb. of nuts and 2400 lb. of dried tops per ac., Maclean Valencia yielded 990 lb. of nuts per ac.—M.P.

888 WITHERSPOON, A. G. and ROGDERS, E. G. **Comparative "Premerge" pre-emergence and post-emergence treatments for control of annual weeds in peanut fields.** *Proc. 7th South. Weed Conf.* 1954 151-3. [Agron. Dep., Univ. Florida, Gainesville]

The trials reported were carried out in Florida on Arredondo loamy fine sand soil. Groundnuts were sown on 19 June and Premerge (alkanolamine salts of DNOSBP) was applied as a pre-emergence treatment on 20 June at rates of 6, 7·5 and 9 lb. per ac., using 64 gal. water as a diluent. Post-emergence treatments at rates of 1·5, 3 and 4·5 lb. per ac. were made on 27 June, immediately after the first compound leaves had expanded. The post-emergence treatments gave considerably better weed control than the pre-emergence treatments. The pro-emergence treatments gave satisfactory weed control for 3-5 weeks, after which annual weeds, particularly *Digitaria sanguinalis* and *Richardia scabra*, became very numerous. The 1·5 lb. per ac. post-emergence treatments gave excellent weed control for 7-8 weeks and the 3 lb. treatment for 12 weeks. The pre-emergence treatments caused no visible plant injury. Post-emergence treatments caused transient leaf-burn. The superior effectiveness of post-emergence treatments was ascribed to the fact that the weeds had just emerged, or were emerging, and that they were more susceptible to direct spraying than to sprays applied to the soil surface before emergence.—P.J.B.

889 JOHN, C. M. and others. **Varieties and forms of groundnut (*Arachis hypogaea*). Their classification and economic characters.** *Indian J. agric. Sci.* 1954, **24,** Pt. 3, 159-93, bibl. 24, illus. [Dep. Agric. Madras]

The botanical characteristics of the various cultivated forms of groundnut (*Arachis hypogaea*) were considered and an attempt was made to classify a collection of 85 forms, on the basis of morphological and economic characters. The collection was divided into 7 main groups: (1) erect, (2) bunch, (3) semi-spreading (4) spreading, (5) trailing, (6) the *nambyquarae-rasteiro* group, (7) the *asiatica* group. The authors consider that groups (1) to (4) belong to the var. *oleifera*, group (5) to var. *gigantea*, group (6) to vars. *nambyquarae* and *rasteiro* and group (7) to var. *asiatica* of *A. hypogaea*. Twenty-two sub-groups of the main groups are distinguished.—W.J.B.

890 TARDIEU, M. Contribution à l'étude écologique de la floraison chez l'arachide. [**A contribution to the ecological study of flowering in groundnuts.**] *Bull. agron. 11. Fr. d'out. mer* 1954, 72-85, bibl. 5. [Cent. Rech. Agron., Bambey, Senegal]

Preliminary results are given from a study of flowering in groundnuts carried out with 2 varieties, 28-204 early and 24-11 late, sown at different dates. An equation was derived from curves which show the percentage of flowers produced at any given time after flowering has begun.—E.B.O.

891 SHIBUYA, T. and SUZUKI, M. **Studies on the formation of unfilled fruit in peanut.** [Japanese] *Proc. Crop. Sci. Soc. Japan* 1954, **23,** No. 2, 87-91, bibl. 9, illus., English summary pp. 90-1. [Hort. Dep., Chiba Univ.]

The development of unfilled pods of groundnuts [*Arachis hypogaea*] and the effect of applications of Ca to the soil on the percentage of such pods yielded per plant were studied. The experiment was carried out on soil where the percentage of unfilled pods is normally high. Untreated experimental plants produced about 70% unfilled pods. Ca [amount not stated] applied to the fruiting and rooting zones (separated by a tin-plate cylinder) of plants gave 100% filled pods. When Ca was applied to the fruiting zone only and to the rooting zone only, the percentage of unfilled pods was about 20% and 30%, respectively, of the total numbers yielded.—From English summary.

892 FOWDEN, L. and WEBB, J. A. **Evidence for the occurrence of γ-methylene-α-oxoglutaric acid in groundnut plants (*Arachis hypogaea*).** *Biochem. J.* 1955, **59,** No. 2, 228-34, bibl. 16, illus. [Dep. Bot. Univ. Coll., London]

893 BLEDSOE, R. W. and others. **Nutrition and**

physiology of the peanut. *Rep. Univ. Fla agric. Exp. Sta. 1953* [n.d.], p. 51.

In a field trial, methyl bromide soil fumigation appeared to be detrimental to the growth of groundnuts in early growth stages, though the plants recovered later in the season. In sand culture studies, S, containing S^{35} as a tracer, was taken up by both the fruiting zone and the root zone, and translocated to all parts of the plants, though more S was taken up by the root than by the fruiting zone. Yields of Virginia Station Runner groundnuts grown in rows 18 in. apart were 1·9 and 1·7 times greater than those grown in rows 27 and 36 in. apart, respectively. Applications of P to groundnuts grown on soils with 443 and 145 lb. P_2O_5 content per ac. had no effect on yields ; on soil containing 35 lb. P_2O_5 per ac., P applications raised yields slightly. Groundnuts utilized applied P very efficiently on soils with very low contents of available P.—P.J.B.

894 TOURTE, R. and FAUCHÉ, J. Les engrais N.P.K. sur l'arachide et le mil au Sénégal. [**NPK manuring of groundnuts and millet (*Pennisetum* sp.) in Senegal.**] *Bull. agron. 11. Fr. d'out. mer* 1954, 7-34, bibl. 2. [Cent. Rech. Agron., Bambey, Senegal]

PEAS

895 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. Sortsforsøg med lave marvaerter 1950-1952. [**Varietal trials with dwarf marrowfat peas 1950-1952.**] *Medd. 505. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **57,** No. 4, 721.

These trials were carried out at 4 locations in Denmark and are a continuation of trials with sugar peas and marrowfat peas, conducted during 1943-5. Highest yields of green peas were given by Weibull's Balder, Imperial Toftø, Continental Ny Munkegaard, Beta, 1541 and Skandia, with 79, 73, 71, 68, 68, and 67 hkg. per ha., respectively. In 2 years' trials, Safir Toftø gave average yields of 81 hkg. per ha. green peas, compared with 80 hkg. per ha. for Weibull's Balder, tested over the same period.—P.J.B.

896 HOWARTH, G. Sammenligning mellem ærters spiring i marken og i laboratoriet. [**Comparison between the germination of peas in the field and in the laboratory.**] *Tidsskr. Planteavl* 1954, **57,** No. 2, 251-70, illus.

In trials in Denmark in 1951, field and garden peas were germinated in the field at 4 locations and in the laboratory. Four laboratory procedures were used as follows : (a) seed soaked in water for 18 hr., then germinated on filter paper ; (b) seed not soaked, germinated on filter paper ; (c) seed soaked in water for 18 hr., then germinated in sand, (d) seed not soaked, germinated in sand. Field germination at one location (Virumgaard) took place under unfavourable conditions and the average germination percentage was 37, compared with an average of 57 at the other 3 locations. Mean germination percentages of seed subjected to treatments (a), (b), (c) and (d) in the laboratory were 65, 83, 61 and 78%, respectively. The seed was sown in the field at a depth of 4 cm. to avoid pigeon damage. There was a close correlation ($r = 0{\cdot}94$) between the germination percentage of field peas sown in the field and that of those germinated in the laboratory, using either sand or filter paper, with no preliminary soaking. In the case of garden peas, the correlation between field and laboratory germination was considerably less and no one laboratory procedure appeared to have much advantage over the others. Further trials were carried out with garden peas in 1952 ; these trials included 14 lots of shelling peas, 8 of sugar peas and 71 of marrowfat peas. The correlations between field and laboratory germination were very similar to those found in the 1951 tests and the results from both years are considered together. Shelling peas and sugar peas reacted in a manner similar to that of field peas. Marrowfat peas showed a much better correlation between field and laboratory germination where they were considered alone, than when they were grouped with shelling peas and sugar peas. Diagrams are given of the correlation between germination percentages in the field and in the laboratory, of round-seeded peas (field, shelling and sugar peas) and of wrinkled-seeded peas (marrowfat). In 102 tests with round peas, positive correlations between field germination and laboratory germination, using procedures (a), (b), (c) and (d) were $r = 0{\cdot}74$, $r = 0{\cdot}84$, $r = 0{\cdot}76$ and $r = 0{\cdot}82$, respectively ; in 116 tests with marrowfat peas, respective correlation values were $r = 0{\cdot}77$, $r = 0{\cdot}6$, $r = 0{\cdot}77$ and $r = 0{\cdot}7$. The differences between correlations found in 1951 ($r = 0{\cdot}94$) and those of the 1952 tests were due to the inclusion of sugar peas and shelling peas in the group with field peas. Observations are made on different forms of seedling abnormality and disease attack found during these experiments.—P.J.B.

897 REYNOLDS, J. D. **Development of the Dried Pea Seed Approval Scheme.** *Agriculture, Lond.* 1954, **61,** No. 12, 593-8, bibl. 4. [Home Grown Threshed Peas Joint Cttee]

898 GREGORY, P. and others. **Preliminary experiments on chemical control of wild oats in peas.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 8. [Pest Contr. Ltd., Chesterford Res. Sta., England]

In trials at 3 locations in East Anglia on

boulder clay, the following herbicides were tested for the control of wild oats in peas. Propham (IPC), CIPC, TCA, CMU, maleic hydrazide, DNOSBP, PCP and 2,4-D. Best control of wild oats followed applications of 7·5 and 15 lb. TCA per ac., as a pre-sowing treatment ; at the first location, 99% control was obtained and at the second, 83% control was secured. At the third location, TCA was relatively less effective, but still superior to all other treatments. Post-emergence treatments with maleic hydrazide retarded flower development in wild oats to a considerable extent. DNOSBP, at a rate of 15 lb. acid equivalent per ac., resulted in top-kill of wild oats, but regrowth was rapid ; control of broad-leaved weeds was good following treatment with this material. Pre-sowing treatments with 2 lb. CMU per ac. gave very good control of charlock (*Sinapis arvensis*) and of bindweed (*Polygonum convolvulus*). Treatment with 7·5 lb. TCA produced a slight check in the growth of peas ; 15 lb. per ac. resulted in relatively more severe growth retardation and reduced pea yields. At the third location, where wild oat infestation was very light, applications of rates above 5 lb. TCA per ac. reduced pea yields.—P.J.B.

899 PROCTOR, J. M. and others. **Observations on the control of weeds in peas following experiments carried out from 1948-1953.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 7, bibl. 3. [Pest Contr. Ltd., Chesterfield Res. Sta., Saffron Walden, Essex]

The results are given of trials carried out in East Anglia during 1947-53 to evaluate different herbicides for weed control in marrowfat peas. Materials compared included DNOC, DNOSBP, 1% MCPA powder and 10% MCPA liquid. In most cases, DNOSBP (NH_3 salt) gave the best results applied when the weeds were at an early growth stage. Where charlock [*Sinapis arvensis*] was prevalent, there was evidence that applications of 1 cwt. of 1% MCPA dust per ac. was of value and would not seriously injure the peas. Comparisons are made of the costs of DNOSBP and hoeing treatments. In most cases, a single hoeing with a tractor gave pea yields equal to those where DNOSBP was used, though DNOSBP resulted in relatively cleaner crops. Respective costs of hoeing and DNOSBP treatments were calculated as 7s. 6d. and £3 - £4 per ac.—P.J.B.

900 REYNOLDS, J. D. and others. **An investigation into the possibilities of low volume application of dinoseb for weed control in peas.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 10, bibl. 4.

The results are reported of experiments carried out during 1951-3 to compare different spray-volumes and pressures used with DNOSBP for weed control in peas. In trials in 1951, in which a constant rate of treatment of 1·3 lb. acid equivalent of ammonium DNOSBP per ac. was used, reducing spray-volume from 100 to 60 gal. per ac. had no effect on pea yields. Reducing spray-volume from 60 to 30 gal. per ac. caused a slight decrease in yields and reducing spray-volume from 30 to 15 gal. per ac. reduced yields significantly. Spray pressures of 30 lb. per sq. in. were more effective than 100 lb. per sq. in. In trials in 1952-3, using the same rate of DNOSBP, low spray-volumes were not appreciably less effective than high volumes. In these trials, rates of 3 lb. DNOSBP in 60 gal. spray-volume per ac. and 1·65 lb. in 15 gal. per ac. were excessive. To obtain equivalent effectiveness of DNOSBP, a lower rate of treatment was required with low spray-volume than with high spray-volume. The results of these trials were considered to show that the dangers of low-volume application of DNOSBP were less than generally thought, but that high-volume treatments were more reliable in their effect.—P.J.B.

901 SPENCER, L. G. **Weed control in peas and lucerne with IPC and CIPC.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 6, bibl. 3. [I.C.I. Ltd., Jealott's Hill Res. Sta., Bracknell, Berks, England]

In trials in East Anglia, applications of 4, 8 or 12 lb. IPC or CIPC per ac. were made to peas grown on a peat soil and on a heavy clay soil. The applications were made either to the soil surface after sowing, or were worked into the seed-bed before sowing. Control of wild oats was poor where the herbicides were applied to the soil surface. Where the herbicides were worked into the soil, good control of wild oats followed applications of 8 and 12 lb. CIPC per ac. and 12 lb. IPC per ac. on both soil types. On the peat soil, no treatments injured the peas ; on the heavy clay soil, 4 lb. IPC per ac. was the only treatment which did not injure the peas.—P.J.B.

902 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. Forsøg med ukrudtsbekæmpelse i ærter. [**Trials on weed control in peas.**] *Medd. 507. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **58**, No. 2, 355-6.

The results are given of trials in Denmark during 1951-3 on the use of herbicides for controlling weeds in : (1) field and culinary peas grown to maturity, and (2) culinary peas grown for picking green. The following treatments were used ; (a) 4·5 and (b) 3·0 l. 20% DNOSBP per ha., (c) 3·0 l. 20% DNOSBP + 0·25 kg. active MCPA per ha., (d) 3·0 l. 20% DNOSBP + 0·125 kg. active MCPA per ha., (e) 0·25 kg. active MCPA per ha. and (f) 0·125 kg. active MCPA per ha. Treatments (a), (b), (c), (d), (e) and (f) in trial (1) resulted in pea yields 11, 12,

12, 12, 7 and 8% above controls. Four litres per ha. of DNOSBP reduced weed incidence to about a quarter of that in untreated controls, and treatments (a), (c) and (d) had about the same effectiveness ; 3 l. of DNOSBP, alone, was somewhat less effective. The use of MCPA, alone, was not effective for controlling weeds. No reduction in the germination of the seed after treatment of the crops was noted. In trial (2), it was evident that the varieties used for picking green were less tolerant of the herbicides than those in trial (1). Treatments with DNOSBP, alone, or with MCPA, did not result in any considerable yield increase, while MCPA, alone, reduced yields, particularly at the 0·25 kg. per ha. rate.—P.J.B.

903 McCLOY, J. and others. **The drying of blue peas.** *Tech. Mem. 118. Nat. Inst. agric. Engng* 1955, pp. 17, bibl. 13, illus. [N.I.A.E. Silsoe]

Preliminary experiments were carried out on the drying of peas to investigate the possibility that certain farm grain-drying processes might account for deterioration in the quality of canned, processed peas. Observations were also made on : (1) drying damage, e.g. split seed-coat and discoloration, (2) the effect of initial moisture content of the peas and of drying-air temperature on germination capacity and the drying rate.—From abstract.

OTHER

904† LAMBERTS, H. Zaadteelt van voederlupine. [**Growing lupins for seed.**] *LandbVoorl.* 1955, **12,** No. 2, 62-7, illus. [Pl. Breed. Inst., Wageningen]

Advice is given on growing lupins for seed in the Netherlands. Heavy soils should be avoided for this purpose because they tend to delay maturity. Cereals are recommended as a preceding crop in the rotation. To avoid the incidence of wilt, lupins should not be grown on the same plot more often than once every 4 years. The soil should preferably be ploughed in the autumn preceding (spring) sowing. The use of N manuring is not advised. Basic slag or superphosphate (for late application) is recommended at the rate of 400 kg. per ha. slag or 100 kg. per ha. superphosphate. K should be applied at the rate of 200 kg. per ha. potassium salts. A soil pH of 5·6 should be aimed at. The seed rate of 80 kg. per ha. is adequate, given 80% germination. Seed disinfection is necessary. The most suitable period for sowing is the second half of March, not later. The distance between rows should be 35 cm. and the depth of sowing 2-3 cm. The seed crop must be at least 200 m. distant from other lupin crops. Inter-row cultivation should be used to control weeds ; pre-emergence sprays of 0·5% DNOC can also be applied. Uneven ripening causes difficulties in harvesting. One means of ensuring more even ripening is to spray the crop with 0·25-0·75% DNOC about 12 days before harvesting. DNOC has no adverse effect on the germination of the seed. Combine-harvesting of seed is possible, but care in the artificial drying of the seed is necessary. Mowing by machine followed immediately by tripoding is recommended. Threshing (from the tripods) may be carried out in the field ; in this case the moisture content of the seed must not exceed 20% since the seed must eventually be dried to 16% moisture content.—W.J.B.

905 SCHAAFHAUSEN, R. V. Labe-labe. Uma leguminosa para adubo verde, forragem e alimentação humana. [***Dolichos lablab*, a legume for the provision of green manure, forage and human food.**] *Rev. Criad.* 1954, **24,** No. 295, 63-6 and 69, bibl. 7, illus.

Successful tests were carried out with *Dolichos lablab* in Brazil during 1949-54. In one trial, *D. lablab* outyielded *Crotalaria paulina, Mucuna* sp. and *Cajanus cajan*, giving a yield of 39·6 m. tons of green matter per ha. In another trial, *D. lablab* yielded more green matter per ha. (32 m. tons) than either *Mucuna* sp. or *Cajanus cajan*. The value of *D. lablab* as forage for cattle and as a source of food for poultry is indicated. The seed can also be used as human food. In an analysis made in 1951, the crude-protein content of the dry matter of the whole plants (when the pods were almost ripe) was 19%. It is recommended that *D. lablab* for forage should be sown between rows of maize to provide stubble grazing after the harvest.—W.J.B.

906 KRISHNA PILLAI, V. N. and CHAKRAVARTI, S. C. **Effect of certain synthetic growth regulators on the form of leaf of *Brassica campestris* Linn. and *Lens esculenta* Moench.** *Agra Univ. J. Res.* 1954, **3,** Pt. 2, 317-22, bibl 11, illus. [Dep. Bot., B.R. Coll., Agra.]

ROOTS

SUGAR-BEET

907 VERENIGDE COOPERATIEVE SUIKERFABRIEKEN. Rassenkeuze bij suikerbieten. [**Choice of sugar-beet varieties.**] *Extra Rassennummer. V.C.S. Bode* 1955, **8,** 34-44.

Twelve varieties of sugar-beet grown in the Netherlands are classified as suitable for lifting (a) early, (b) late or (c) in the middle of the harvesting season. Varieties of group (a), which have a relatively high sugar-content in the roots early in the harvesting season, are especially suitable for use in the north where the growing season is short.

The use of varieties of different groups enables the lifting operation to be spread evenly over the harvest season. The yields of sugar per ha. (in relative terms) given by groups (a), (b) and (c) in northern and southern districts of the Netherlands in 1951-4 are tabulated. When harvested early, group (a) yielded slightly more sugar per ha. than the other groups in the north and slightly less than the other groups in the south. Each variety tested is described. Recommendations are made for the use of the different varieties for lifting in early, late and mid-season in various parts of the country. —W.J.B.

908 NEEB, O. Möglichkeiten zur Verbesserung der Keimprüfungsmethoden von Rübensaatgut. [**Possibilities for improving seed-testing methods for beet seed.**] *Landw. Forsch.* 1955, Sonderheft 6, 145-9, bibl. 4. [Inst. Zuckerrübenforschung, Göttingen, W. Germany]

Figures are given which show the difference between germination capacity as determined in the laboratory and germination which takes place in the field. The difference is not constant but is greater in small glomerules and monogerm seed than in large glomerules. The difference is attributed, not to true germination capacity, but to the proportion of seedlings which undergo abnormal development. An attempt has been made to determine true germination capacity experimentally from the weight of sprouts formed in darkness. Results by this method agreed with germination in the field.—D.B.

909 FILUTOWICZ, A. and BEJNAR, W. Wpływ wieku nasion buraków cukrowych na ich wartość siewną. **The influence of the age of sugar-beet seeds on their seeding value.** *Rocz. Nauk Roln. Ser. A* 1954, **69,** No. 3, 323-49, bibl. 5, English summary p. 340.

Hotbed-, glasshouse- and field-experiments were carried out with 11 varieties of sugar-beet seeds from 7 successive crop years for the purpose of determining the influence of age on their value as seed. The influence of the age of seeds on the number of plants obtained per 100 seeds, the percentage of bolters, the yields of roots and leaves, the sugar content of roots, and the degree of infection with *Cercospora beticola* was the subject of experiments. The results led to the following conclusions: 1. Basically, 1- to 4-year-old seeds do not differ in percentage germination. 2. Older seeds (5-7 years) show a decline in germination vitality. 3. Plants from seeds older than 4 years sprouted 1 to 2 days later, in field conditions, than plants from younger seeds. 4. No relation was proved to exist between the age of seeds and the tendency to bolt. 5. The age of seed (within the limit of 7 years) had no effect on the value of beets produced from such seed from a practical point of view. 6. No relationship was observed between the age of seeds and the degree of infection by *Cercospora beticola.* —From authors' summary.

910 POIGNANT, P. and CHAFFARD, M. Quatre années d'expérimentation sur le désherbage chimique de la betterave sucrière par la technique de préémergence (1). [**4 years' experiments on the chemical control of weeds in sugar-beet fields by the pre-emergence technique.**] *C.R. Acad. Agric.* 1955, **41,** No. 2, 74-81, bibl. 2.

The best herbicides for destroying annual dicotyledonous weeds (also meadow grass and foxtail) were dinitro-2,4-ammonium phenate (DNP NH_4) and sodium pentachlorophenate (PCP Na). The former is recommended. It should be sprayed from a horizontal sprayer regulated to deliver 800-1000 l. of the solution per ha., the concentration being such as to give 8-10 kg. active substance per ha. The herbicide, which diffuses through the superficial layers of soil in which the weed seeds lie, is applied about 1 week after sowing the crop, i.e. before it emerges. This is a new technique and the conditions for its success are deep planting of the sugar-beet seed and, during spraying, a moist soil and absence of wind. Perennial weeds cannot be destroyed by DNP NH_4, but thistle and convolvulus can be destroyed by 2,4-D or MCPA.—D.B.

911 PARKER, C. **Chemical weed control in sugar beet: a report of experimental work in 1954.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 6, bibl. 3. [Norfolk Agric. Exp. Sta., Sprowston]

The results are given of trials under a wide range of environmental conditions in East Anglia on the use of IPC as a pre-sowing treatment, CMU, Endothal and an oil formulation of PCP as pre-emergence treatments, and solutions of sodium chloride and sodium nitrate as post-emergence treatments for weed control in sugar-beet. In the pre-emergence trials, weed control and injury to sugar-beet was lowest on the heavy soils and on peat soil. Dry conditions for up to 14 days after treatment also severely limited herbicidal effectiveness. Endothal was effective against *Veronica* spp., *Spergula arvensis, Fumaria officinalis* and *Polygonum* spp., but less effective against *Raphanus raphanistrum* and *Chenopodium album.* CMU, at rates not over 0·16 lb. per ac., which was the safe limit, except on heavy soils, gave fairly good control of *S. arvensis* and *C. album,* but moderate to poor control of other species. PCP in oil, or the Na formulation, showed little selective action against any species and little selective action in favour of the crop. CMU seriously diminished the vigour of the sugar-beet; Endothal slightly reduced its vigour and PCP hardly at all. The spray treatments

had no apparent effect on bolting. In the pre-sowing treatments with IPC, 3 lb. IPC per ac. moderately retarded germination and 6 lb. per ac. seriously retarded it. IPC treatment at a rate of 4 lb. per ac. showed promise for the control of wild oats, *Stellaria media* and *Poa annua* when disced into the seed-bed. Post-emergence applications of 2·5-3·5 cwt. sodium nitrate or sodium chloride or mixtures of both, in 100 gal. water per ac., were effective for controlling most weeds, except *C. album*. Such sprays applied to sugar-beet with at least 2 true leaves, checked growth for a few days only.—P.J.B.

912 KINCH, D. M. and CARLETON, W. M. **Soil treatments for weed control.** *Proc. 7th Reg. Mtg, Amer. Soc. Sug. Beet Technol., East. U.S. and Canada 1953* 21-7. [Michigan State Coll., East Lansing]

Studies are reported on the effectiveness of different methods of physically processing soil so as to inhibit the germination of weed seeds where sugar-beet is to be sown. Methods tested included : heat energy, ultrasonic energy and mechanical energy. In trials using heat energy, it was calculated that about 55 Btu per ft. of row would be required to kill the weed seeds contained in a strip of soil 4 in. wide and 0·75 in. deep. With ultrasonic energy, the level of 50 watts used was insufficient to reduce seed germination in a time of exposure suitable for use in the field. The mechanical methods used for processing soil included a percussion head, in which rotating bars struck the soil, and soil ejection, in which the soil was propelled against an impact plate by two vanes. Both the heat energy and the mechanical processing methods appeared to hold possibilities for reducing weed-seed viability on a field scale.—P.J.B.

913 ANDERSEN, R. N. and HELGESON, E. A. **Can fall preplanting treatments control wild oats in sugar beets ?** *Bimon. Bull. N. Dak. agric. Exp. Sta.* 1955, **17,** No. 4, 128-30, bibl. 6.

In one year's trials, herbicides were applied in 20 gal. spray-volume per ac. on 17 Oct., 1953. After application, all plots were disced twice to a depth of 4-5 in. and then ridged to prevent wind erosion. The herbicides used were : IPC at 8, 12 and 18 lb. actual material per ac. ; TCA at 8, 12 and 18 lb. acid equivalent per ac. ; and 6 lb. IPC + 6 lb. TCA and 9 lb. IPC + 9 lb. TCA per ac. Sugar-beet was sown on the plots in the spring of 1954. On control plots, wild-oat numbers were 56 per 26 ft. of row-length ; on treated plots, numbers ranged from nil to 10·5. Wild-oat counts were made when the sugar-beet was in the 1- to 2-leaf stage. TCA was more toxic than IPC to the sugar-beet, but no treatment significantly reduced stands. No yield data are given, but observations of plant vigour at mid-season did not show any differences between controls and treated plots.—P.J.B.

914 RIRIE, D. **Water grass control in sugar beets.** *Proc. 6th Ann. Calif. Weed Conf. 1954* 30-2. [Agron. Dep., Univ. California, Davis]

In trials during 2 years, a number of herbicides were used to control *Echinochloa crus-galli* in sugar-beet. In the first year's trials, Na TCA, dichloral urea, IPC and Endothal, used as pre-emergence sprays were all ineffective. In the second year's trials, Na TCA, applied at rates of 8 and 16 lb. per ac. and raked into the soil surface, gave good weed control, which was thought to be due to the fact that rain fell between the time of sowing and emergence. Some injury was caused to the sugar-beet. In further trials, applications of 2, 4 and 6 lb. Dalapon per ac. were made as post-emergence treatments and were very effective against *E. crus-galli*. Some marginal leaf-burn was noted on the sugar-beet ; no yields were recorded in this trial. In an additional trial, there was some evidence that Dalapon reduced sugar yields.—P.J.B.

915 JONES, F. G. W. and HUMPHRIES, K. P. **The use of seed dressings containing γ-BHC in the establishment of sugar-beet seedlings.** *Ann. appl. Biol.* 1954, **41,** No. 4, 562-77, bibl. 4, illus. [Sch. Agric., Univ. Cambridge]

916 JONES, F. G. W. and others. **The effects of defoliation and loss of stand upon yield of sugar beet.** *Ann. appl. Biol.* 1955, **43,** No. 1, 63-70, bibl. 5, illus. [Sch. Agric., Cambridge]

Seedling pests of sugar beet cause defoliation and loss of stand. Attempts were made to assess the effects of these types of injury by means of field trials in which the defoliation and loss of stand were produced artificially [defoliation by scissors] shortly after singling. The main effects of these treatments were to modify the size of the plants without greatly influencing their percentage sugar content. Little loss of crop resulted until 50% of the leaf area or 50% of the plant population had been destroyed. The yield from re-sowing after removal of all the plants was inferior to that from stands depleted of half or two-thirds of their initial plant population. The relation between the results of artificial injury and the injury produced by seedling pests is briefly discussed.—Authors' summary.

917 JONES, F. G. W. **The control of wireworms in beet. A note on the use of BHC and Aldrin.** *Brit. Sug. Beet Rev.* 1955, **23,** No. 3, 113-15, illus.

918 HANSEN, H. P. Et overblik over nyere erfaringer om virus-gulsot hos bederoer. [**A review of recent experiences on virus yellows in beet crops.**] *Tidsskr. Planteavl* 1954, **58,** No. 2, 298-332, bibl. 97.

Aspects discussed include : the yield reduction caused by virus yellows, symptoms, methods of infection, virus yellows *in vitro* and *in vivo*, different types of virus yellows, the ecology of vectors, the occurrence of the disease, immunity and resistance to virus yellows in the genus *Beta*, the effect of cultivation practices on the incidence of yellows and isolation of crops from sources of infection.—P.J.B.

919 STOUT, M. **Sugar beet evaluation. Determining respiration rate and sampling for chemical analysis of sugar beets.** *J. agric. fd Chem.* 1954, **2,** No. 26, 1324-8, bibl. 3, illus. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric., Salt Lake City, Utah]

A description is given of a modified drill for refractometric sampling of sugar-beet roots. The drill penetrates to a very small distance into the root and pressure on the drill bit when in the root enables juice to be expressed from the macerated tissue for refractometric analysis. Another modified instrument enables a cylinder, 1 in. diam., to be taken from the root ; the cylinder can then be sectioned for respiration measurements, for morphological studies, or can be disintegrated for chemical analysis. Apparatus for measurements of respiration is described. Methods of analysis for amino N as glutamine and for K and Na are outlined. Data are given of the average sample weights, sugar, Na, K and amino-N content and respiration rate of a number of commercial, inbred and polyploid sugar-beet, red beet, mangel and fodder-beet varieties and of the correlation coefficients between the different values. There was a fairly consistent negative correlation between root weight and sugar content, except in the case of one red beet variety. The correlation between root weight and Na content was positive, except in Detroit Dark red beet and the sugar-beet inbred SL904N. Root weights and K content were consistently positively correlated, except in the case of Detroit Dark red beet and SL8318, a mangel × sugar-beet cross. Sugar content and amino-N contents were negatively correlated, with no significant exceptions. Sugar and Na contents were negatively correlated in all cases, the correlations in this case being the most significant of all those studied. Respiration rate, in most cases, was positively correlated with sugar content.—P.J.B.

920 TULLIN, V. **Response of the sugar beet to common salt.** *Physiol. Plant.* 1954, **7,** No. 4, 810-34, bibl. 27, illus. [Bot. Lab., Univ. Lund, Sweden]

The results are presented of a physiological study on the effect of NaCl on the growth, chemical composition of the leaves and the transpiration of sugar-beet. The plants were grown in pots in sand containing given amounts of basic nutrients. Water supply was regulated to amounts ranging from 13 to 88% of field capacity and different amounts of NaCl were added. The experiments were divided into 2 main groups as follows : (a) NaCl added before seed was sown and (b) added to 2-month-old plants. Amounts of NaCl added gave concentrations of nil, 0·05, 0·1, 0·15, 0·2, 0·25 and 0·3% in the nutrient solution. Seed germination was markedly reduced by increasing NaCl concentrations. High NaCl concentrations (particularly those above 0·1%) caused death in the main roots of the seedlings, but adventitious root development occurred. At concentrations of 0·2-0·25% NaCl, the main root appeared to grow so rapidly that adventitious roots had no time to develop before the death of the main root. It was concluded that the effect of high concentrations of NaCl largely operated through decreased availability of water. Low concentrations of NaCl appeared to have a growth-promoting effect on the seedlings, irrespective of the moisture content of the sand cultures. In experiments with 2-month-old plants, concentrations of 0·5, 1 and 1·5% NaCl in the solution cultures were used. The NaCl was applied on 15 April and plants harvested on 29 April. Fresh-weight yields of tops where concentrations of nil, 0·5, 1 and 1·5% NaCl were used were 37·4, 44.3, 47·6 and 48·8 g. per pot, root yields ranged from 40·7 to 41·5 g. per pot, and dry-matter yields of tops were 7·1, 8·1, 8·8 and 8·8 g., respectively. Irrespective of the concentration of NaCl in the nutrient solutions, Na was accumulated by the plant leaves until a given, relatively constant content of Na was reached. Na in the nutrient solutions tended to decrease Ca uptake and Si accumulation in the leaves. Cl content in the leaves was negatively correlated with Si content.—P.J.B.

921 ROUSSEL, N. Le problème de l'expérimentation des variétés de betterave et ses relations avec la biométrie. [**The problem of experimentation with sugar-beet varieties and its relations with biometry.**] *Publ. tech. Inst. belge Amélior Better.* 1954, **22,** No. 3, 139-68, bibl. 8, English summary p. 168. [Inst. Belge Amélior. Better., Tirlemont, Belgium]

922 AMERICAN SOCIETY OF SUGAR BEET TECHNOLOGISTS, EASTERN UNITED STATES AND CANADA. **Proceedings of the 7th Regional Meeting.** 1953, pp. 92.

INVESTIGATIONS REPORTED :

1. Progress report on nutritional studies with sugar-beet. By D. D. Dolson, pp. 2-5.
2. Methods and rates of application of fertilizers for sugar-beet grown on organic soils. By J. F. Davis, pp. 11-17.
3. Results from varying dates of application of nitrogen to sugar-beet. By G. Nichol, pp. 18-20.

4. Soil treatments for weed control. By D. M. Kinch and W. M. Carleton, pp. 21-7. [See Abs. 912.]
5. Forage management and sugar-beet yields. By M. H. Erdmann and others, pp. 80-5.
6. Sugar-beet weed-control trials in 1952. By B. H. Grigsby, pp. 91-2.—P.J.B.

FODDER-BEET

923 EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE. Field Experiments Committee. **A report on three years' experimentation with fodder-root varieties, 1951 to 1953.** *Tech. Bull. 12. Edinb. E. Scot. Coll. Agric.* 1954, pp. 10.

The fodder-beet varieties Corona, Eureka, Gul Daeno X, Hvid Stryno X, Hunsballe X and Pajbjerb Rex X were compared. Magnificent swede and Red Intermediate mangel were also included in the trials. Results are given of root yields, root dry-matter yields, top-yields, percentage bolters and ease of lifting. The trials indicated that dry-matter yields per ac. from fodder-beet roots were similar, with the exception of Corona, to those from mangels, but superior to swedes. Fresh-top yields of fodder-beet were much heavier than those of swede or mangel.—M.P.

924 INSTITUUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. Bericht over rassenkeuze. No. 183. Voederbieten, 1955. [**Choice of varieties. Pamphlet No. 183. Fodder-beet, 1955.**] *Suppl. 4. LandbVoorl.* 1955, **12,** No. 2, 1-5.

The results of the 1951-4 regional trials in the Netherlands with fodder-beet varieties are tabulated and briefly discussed. The varieties are divided into 3 groups according to dry-matter content : high = 17-23%, medium = 14-17% and low = 10-14%. Within these groups are sub-groups of varieties. In general, the highest average yield of dry matter (in the root) per ac. was obtained from the sub-group of varieties known as Jaapjes Groenkragen H.G. (Jaapjes green-top, high dry-matter) which belongs to the group of medium dry-matter varieties. In this group, the variety Bison gave the highest average yield of dry matter per ac. (results presented as relative figures), followed closely by Groenkraag C.B. These two varieties had a dry-matter content of 17 and 16·6%, respectively. In the high dry-matter group, Hinderupgaard XI gave the highest average yield of dry matter per ac., 20·2% (trials began in 1953).—W.J.B.

925 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. Forsøg med stammer af foderbeder: runkelroe, fodersukkerroe og sukkerroe 1950-1953. [**Varietal trials with fodder-beet: mangels, fodder sugar-beet and sugar-beet for fodder 1950-1953.**] *Medd. 508. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **58,** No. 2, 357-9.

The trials reported were carried out at 9 locations in Denmark. Two mangel, five fodder sugar-beet and two sugar-beet for fodder varieties were placed in the 1st Class category. The mangel varieties Barres Øtofte Nova XI and Hunsballe XI gave mean dry-matter yields of 116 hkg. per ha. from the roots and 35 per ha. from the tops, with dry-matter contents in the roots of 15·5 and 14·5%, respectively. Mean root dry-matter yields of the fodder sugar-beet varieties Gul Daeno XI, Hvid Øtofte XI, Pajbjerg Korsroe XI, Rød Øtofte XI and Pajbjerg Rex XI were 119, 117, 117, 117 and 114 hkg. per ha., mean dry-matter yields from the tops were 37, 39, 38, 40 and 44 hkg. per ha. and mean root dry-matter contents were 16·1, 18·6, 16·4, 18·4 and 19·7%, respectively. Of the two sugar-beet for fodder varieties, Hinderupgaard XI and Hunsballe XI gave average root dry-matter yields of 122 and 118 hkg. per ha., average dry-matter yields of tops of 41 and 43 hkg. per ha. and had average root dry-matter contents of 20·7 and 20·8%, respectively. Descriptions are given of each variety and data are given of their agronomic characters.—P.J.B.

926† KELLER, E. R. and FREY, E. Über die Schosserbildung bei Futter- und Zuckerrüben im Jahre 1954. [**Bolting in fodder- and sugar-beet in 1954.**] *Mitt. schweiz Landw.* 1954, **2,** No. 12, 207-11, bibl. 7, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon, Switzerland]

Bolting, prevalent in fodder- and sugar-beet during the summer of 1954, was attributed to the long period of low temperatures (about 4°C.) at the beginning of the growth period. Tendency to bolt is a varietal character. Among fodder-beets it is strong in Corona, französich Grünköpfige, Perfektion, Produktiva and Zentaur, but there is resistance to bolting in the red and yellow Øtofte and in certain Barres types. Among sugar-beets there is a strong tendency to bolt in Kleinwanzleben CR, Beta 242/53 and Buszczynski CLR, but Kleinwanzleben E, N and Polybeta show a strong resistance to bolting.—D.B.

SWEDISH TURNIPS

927 INGEBRIGTSEN, S. Forsøk med ulik planteavstand for kålrot og ulik tynningsavstand for gulrot. [**Experiments with various spacings for swedes and various thinning rates for carrots.**] *Forskn. Fors. Landbr.* 1953, **4,** No. 5, 385-95, bibl. 7, English summary p. 394. [State Agric. Exp. Sta., Holt, Tromsø, Norway]

The trials reported were carried out at Holt, Tromsø, during 1944-51. In trials with the swede variety Göta, the seed was sown in rows 60 cm. apart, with 15, 20, 25 and 30 cm. between plants in the row. Mean yields of roots for the different plant spacings were 4494, 4510, 4407 and 4195 kg. per decare (0·1 ha.), dry-matter yields of roots were 453, 464, 441, and 421 kg., mean yields of tops were 2952, 2754, 2518 and 2371 kg. per decare and total fodder-unit yields were 608, 605, 569 and 541 per decare, respectively. In these trials, the 30 cm. spacing gave the best economic returns and it is recommended that a spacing of 30-35 cm. between plants, where grown in rows 60 cm. apart, should be used in the Tromsø region.—P.J.B.

POTATOES

928 MONTAGUE, V. J. and IVINS, J. D. **Influence of plant spacing on yields of ware potatoes.** *Agriculture, Lond.* 1955, **61,** No. 12, 586-7, bibl. 5. [Univ. Nottingham, School Agric.]

Sprouted King Edward certified S.S. seed of 2 grades, 1·5-1·75 in. and 1·75-2 in., were planted in drills 28 in. apart at inter-plant distances of 12, 16, 20, 24, 28 and 32 in. Over the range of distances 12 - 32 in., the larger grade of seed potatoes gave total yields decreasing from 25·16 to 17·91 tons per ac. and yields of ware (over 2·25 in.) increasing from 5·63 to 6 tons per ac. Comparable figures for the smaller grade were 23·91 to 17·95 tons per ac. and 5·47 to 7·01 tons per ac. Thus in the case of both grades total yields decreased and yields of ware increased slightly with increasing inter-plant distances up to 32 in. A brief review is given of the results obtained by other workers in the same field, who obtained similar results in that they found that yields of ware potatoes were not reduced by planting at greater than normal inter-plant distances.—W.J.B.

929 MCDERMOTT, N. and IVINS, J. D. **Rainfall as a factor influencing the yields of potato crops.** *NAAS Quart. Rev.* 1955, No. 27, 106-8. [Sch. Agric., Univ. Nottingham, Sutton Bonington, England]

A brief note is given on the relation between rainfall during May-September, and potato tuber yields at Sutton Bonington during 1947-54.—P.J.B.

930 HERRMAN, F.-J. Die Beregnung. Mittel zur Sicherung und Steigerung der Erträge im Kartoffelbau. [**Irrigation. A means of ensuring and increasing potato yields.**] *Kartoffelbau* 1955, **6,** No. 3, 52-3, illus. [Mönchengladbach, W. Germany]

The water requirements at different stages of growth of main crop and early potatoes are outlined. Examples are given of large yield increases (e.g. 8000-10,000 kg. ha.), improvement of size of tubers (fewer of less than 4 cm. in diam.) and better storage quality as a result of irrigation. For the main crop, the best period for irrigation is from the beginning of tuber formation. In the case of early potatoes, irrigation during May assists the crop to withstand the night frosts as well as drought. Spray irrigation is used and apparatus is described for operating on large and small areas. Returns from increased yields exceed the cost of irrigation.—D.B.

931 PEHL, P. and BUCHNER, A. Stickstoffdüngung und Beregnung. Einfluss auf Ertrag und Qualität der Frühkartoffeln auf leichten Sandböden. [**Nitrogen manuring and irrigation. Influence on yield and quality of early potatoes on light sandy soils.**] *Kartoffelbau* 1955, **6,** No. 3, 54-5. [Limburgerhof, W. Germany]

With heavy manuring (especially N-fertilizer) and irrigation (3-4 sprayings each corresponding with 15-20 mm. rain) during the dry spell, a total yield of about 400 dz./ha. of early potatoes was obtained within 3-3·5 months and the crop contained a high percentage of ware potatoes. Taking the average results for 3 years, irrigation equivalent to 1 mm. rain produced a yield increase of 1·8 dz./ha. of ware potatoes. Returns justified the costs. [1 dz. = 100 kg.]—D.B.

932 PETERSON, A. S. **Potato yield increases on subterranean clover land.** *Agric. Gaz. N.S.W.* 1954, **65,** No. 11, 565-6 and 604, illus.

Demonstrations in the Goulburn and Tumut districts of New South Wales showed that potatoes grown on land previously under subterranean clover yielded approximately 3 tons per ac. more than did potatoes grown on land where clover had not been grown.—M.P.

933 RUSSCHEN, J. Loofklappen en eggen van pootaardappelen. Ervaringen in 1954. [**Leaf-destruction and harrowing of potatoes grown for seed-production.**] *LandbVoorl.* 1955, **12,** No. 2, 73-6, illus.

Practical instructions are given for the use of various types of equipment (including special machines and various types of harrow) for destroying potato foliage by mechanical means.—W.J.B

934 REESTMAN, A. J. and RIEPMA KZN, P. Is het gebruik van arsenieten voor het doodspuiten van aardappelloof schadelijk voor de grond ? [**Does the use of arsenite for killing potato foliage damage the soil ?**] *LandbVoorl.* 1955, **12,** No. 2, 68-72, bibl. 14, illus.

The literature on the subject is reviewed. An experiment is quoted in which 4 years after the application of sodium arsenite at the rate of 180 kg.

As_2O_3 per ha. crop yields were still 80% lower han on untreated soils. The damaging effect of rsenites on plant growth is more marked on light han on clay soils. The use of DNOC for the destruc- on of potato foliage is also discussed with refer- nce to the literature.—W.J.B.

35 National Institute of Agricultural Botany. **Varieties of potatoes.** *Fmr's Leafl. 3. NIAB* 1954, pp. 6.

Details are given of the 5 first-early, 6 second-early nd 5 main-crop recommended varieties, with a abulated summary of their characteristics.—M.P.

36 Selsjord, I. Forsøk med tidlege potetsortar. **Experiments concerning early potato varieties.** *Forskn. Fors. Landbr.* 1953, **4,** No. 5, 439-56, bibl. 8, English summary p. 455. [State Agric. Exp. Sta., Forus, Norway]

The results are reported of yield trials with early otatoes, carried out at Forus, near Stavanger, and t a number of widely-scattered locations in west nd south-east Norway during 1945-52. Planting ates at Forus and at the other locations were on verage 13 and 29 April, respectively. Three har- est dates were used, i.e. about 11, 21 and 31 July t Forus and 22 July and 2 and 12 August at the ther locations. Mean yields of Epicure at the first nd second harvest dates were highest of all var- eties in terms of both tuber and dry-matter yields ; ompared with the two next best varieties, Epicure ave tuber yields 86 and 169 kg. per decare more han Green Mountain and British Queen at the rst harvest date at all locations and 21 and 190 kg. er decare more at the second harvest date at all ocations, respectively. At the third harvest date, uber yields of Green Mountain were slightly igher than those of Epicure and both were uperior to all other varieties. At the third harvest ate, certain of the medium-early varieties had ry-matter yields equal to those of Epicure. In erms of ware potatoes, Epicure was still superior o all other varieties at the first and second harvest ates ; at the third harvest date, 140/40, King George V and British Queen gave somewhat higher ields than Epicure. British Queen gave the highest uber and dry-matter yields of all the medium- arly varieties at the first and second harvest ates, though 140/40 gave higher yields of ware ubers than British Queen at Forus at these harvest ates. The medium-early variety 140/40 gave the ighest total tuber and ware yields at Forus at he third harvest date. This variety was produced at orus from Kerr's Pink × Venus. Observations re also made on Green Mountain, King George V, aga, Irish Cobbler and Doone Early. In 1951, the erman varieties Primula and Vera, and, in 1952, he Swedish variety Eva was included in the trials nd all three gave high yields.—P.J.B.

937 Fridriksson, S. Samanburdur á kartö- fluafbrigdum. 1948-1953. **Variety trials of potatoes [in Iceland].** *Rep. Ser. A. No. 9. Dep. Agric. Univ. Res. Inst. Reykjavik* 1954, pp. 23, bibl. 3, English summary pp. 21-2.

From 1948-53 randomized-block trials were carried out with 142 potato varieties obtained locally, from Sweden, from the USA and from Tierra del Fuego. Kerr's Pink was used as the standard. The data obtained for all varieties are fully tabu- lated and include : the average varietal yields in 100 kg. per ha. for each year from 1948-53, also expressed as a percentage of the standard variety ; the percentage of small potatoes. The starch and dry-matter contents of the varieties were deter- mined in 1953 and averaged 13·4% and 19·2%, respectively. The starch and dry-matter yields per ha. were calculated. The varieties Sequoia and Kennebec were the best and are recommended as additions to Icelandic market potatoes. Sequoia was also one of the four most frost-resistant varieties.—M.P.

938† Keller, E. R. Augusta und Benedikta, zwei neue Kartoffelsorten im Schweizeris- chen Richtsortiment. [**Augusta and Bene- dikta, two new potato varieties in the Swiss official list.**] *Mitt. schweiz. Landw.* 1955, **3,** No. 3, 42-4, illus. [Eidg. Landw. Versuchs- anst, Zürich-Oerlikon]

Augusta (Bona × Sämling) is a medium-early potato which gives good yields of small- to medium- sized tubers with a high starch content. It shows some resistance to blight and wart and considerable resistance to virus disease, but is susceptible to scab. It is a good boiling potato, but on account of its deep-set eyes it is not practical to use it for culinary purposes. Its chief use is for fodder and silage. Benedikta (Aquila × Sämling) is a high- yielding medium-late potato, and in starch yield it exceeds Ackersegen. It is resistant to blight but somewhat susceptible to virus disease. It is chiefly important as a fodder potato.—D.B.

939 Stevenson, F. J. and others. **Delus : a new variety of potato, immune from the common races of the late blight fungus, high in per- centage total solids, and adapted to growing conditions in Delaware.** *Amer. Potato J.* 1954, **31,** No. 12, 410-13. [Agric. Exp. Sta., Delaware Univ., Newark]

A description and the characteristics of Delus (Mohawk × USDA Seedling 96-56) are given. In comparative trials in Delaware, the yields of Delus were comparable with, or slightly better, on an average, than, those of the 2 standard varieties Katahdin and Irish Cobbler.—E.B.O.

940 Akeley, R. V. and others. **Saco : a new late-maturing variety of potato, immune**

from common race of the late blight fungus, highly resistant to, if not immune from, net necrosis, and immune from mild and latent mosaics. *Amer. Potato J.* 1955, **32,** No. 2, 41-8, bibl. 3. [Agric. Exp. Sta., Maine Univ., Orono]

A description and the characteristics of Saco (USDA Seedling X 96-56 × USDA Seedling 41956) are given. Saco is high-yielding, its yields of marketable tubers being often higher than those of the standard varieties Green Mountain, Kennebec and Katahdin. In Maine, its tubers were as high in dry-matter content as these varieties. Saco is susceptible to Verticillium wilt but yields comparatively well in soil infested with the causal fungus.—E.B.O.

941 GEIERSBERGER, E. Der Saatkartoffelbau des Bayerischen Waldes, seine natürlichen Gegebenheiten und Ausdehnungsmöglichkeiten auf Grund des Vorkommens der grünen Pfirsichblattlaus (*Myzodes persicae*, Sulz.). [**Seed-potato cultivation in the Bavarian Forest, its natural conditions and possibilities for expansion in view of the occurrence of the green peach-leaf aphid.**] *Z. Acker- u. Pflbau* 1955, **99,** No. 1, 55-74, bibl. 94, illus. [Inst. Acker- und Pflanzenbau, Weihenstephan, W. Germany]

On the basis of this examination of the incidence of the peach-leaf aphid, *Myzus persicae*, in seed-potato fields in the Bavarian Forest, it is stated that production should be limited to the Lower Bavarian Forest south of the Höhenrücken. This is scheduled as a healthy area.—D.B.

942 KRIJTHE, N. Kiemproven met aardappelen, die in zout water hebben gelegen. [**Sprouting tests with potatoes kept in salt water.**] *Mimeo. paper S. 1591. Cent. Inst. Landbouwk. Onderz. Wageningen* [n.d.], 1-18, illus. [Received 1955]

The sprouting-capacity of Bevelander seed potatoes after immersion in salt water was tested in an experiment in 1953 in which the tubers were kept in water containing 0, 1, 2, 3, 3·6 and 5% NaCl for periods varying from 1 to 14 days. The temperature varied from 15° to 20° C. during the experiment. The potatoes were placed in the water on 5 and 6 Feb. and batches were removed each day. The degree of sprouting observed in the tubers was recorded on 20 Feb. and 4 March. The results of the experiment are summarized as follows. The apical eyes were damaged after 2 days immersion; the last eyes to be visibly damaged were the basal ones. The apical eyes were all killed after 6-9 days immersion in salt water and after 14 days immersion in fresh water (no salt). Non-apical eyes were visibly damaged after 3 days immersion in salt water. There was a marked increase in the number of eyes damaged by water containing relatively high salt concentrations (3·6 and 5%) compared with the numbers damaged after the same period of immersion in water containing relatively low salt concentrations. Most eyes were visibly damaged after 5-6 days immersion at salt concentrations of 3·6 and 5%, or, after 7 days at lower salt concentrations, or after 9 days in fresh water. The March observations showed that immersion in salt water for short periods (4 days or less) increased the number of long sprouts (over 1 cm.) produced by the tubers. The number of long sprouts produced per tuber was decreased following immersion in salt water for 5 or more days ; when the salt concentrations were progressively decreased this decrease occurred after increasingly longer periods of immersion. The effect of immersion on the appearance of the skin and flesh of the tubers is described.—W.J.B.

943 SCHULZE, E. Mechanische Keimanregung, Schosserbildung und photoperiodisches Verhalten bei Kartoffeln. [**The mechanical stimulation of sprouting ; bolting and photoperiodic behaviour in potatoes.**] *Z. Acker- u. Pflbau* 1954, **98,** No. 4, 385-422, bibl. 53, illus. [Inst. Boden- und Pflanzenbaulehre, Bonn, W. Germany]

The mechanical stimulus for breaking dormancy in potato tubers consisted simply of shaking the tubers for 0·5 - 2·0 min. in wooden boxes and then embedding them in moist peat (to prevent rotting) and allowing them to germinate. By this means, two crops of potato tubers could be obtained in one growing season. The shape of the tubers thus obtained changed from oval to round and their skins became fissured in a reticulate pattern. The above-ground parts of plants grown from shaken potatoes had the appearance of bolters. The phenomenon of bolting is usually attributed to a somatic mutation. However, results of experiments with 15 varieties having different maturing dates led to the conclusion that the growth modifications were related to photoperiodic influences and were brought about by long day. Under long day (a) the production of reproductive organs was stimulated, excess assimilatory tissue being produced later ; (b) a tall, widely spread herbaceous growth was produced with relatively small, thick, light-green leaves in contrast to the bushy growth with relatively large, soft, dark-green leaves produced under short day; (c) stolons became larger ; and (d) symptoms of degeneration, e.g. leaf roll, appeared.—D.B.

944 SAWYER, R. L. and SMITH, Ora. **A study of the oxygen-periderm relationship in potato tubers and the effect of oxygen on the normal breaking of the rest period.** *Amer. Potato J.* 1955, **32,** No. 1, 15-22, bibl. 8. [Cornell Univ., Ithaca, N.Y.]

The experiments described were carried out

ainly to determine whether O has any effect on ıe rest period of potato tubers, and, if so, how it ffects it. There is diversity of opinion in this atter. In the controlled atmosphere experiments ıbers in closed containers showed a tendency to ɔrout earlier in low O concentrations than in high concentrations. This was more apparent at 50°F. ıan at 64°F. ; at 85°F. there were no differences. he results from the diffusion experiments in- cated that the wound periderm which forms on jured tubers is more permeable to both O and ırbon dioxide than is the normal periderm, and ıat the periderm of moist-stored tubers has a ster rate of diffusion than has the periderm of dry- ored tubers. From the peeling experiments fferent results were obtained according to hether freshly-harvested tubers, or tubers which ıd completed their rest period, were used. Freshly- ırvested tubers " peeled several times " or peeled thick " sprouted earlier than did normal ıbers or tubers " peeled thin." In experiments ith tubers which had terminated their rest period, ıbers with normal periderm sprouted earlier than d peeled tubers. As a general conclusion it is sug- sted that the oxygen-periderm relationship does ɔt affect the normal breaking of the rest period ıd that O *per se* is not the normal factor regulating ıe rest period of the potato tuber.—E.B.O.

45 RAUCOURT, M. Les traitements fongicides et les rendements de la pomme de terre. [**Fungicidal treatments and potato yields.**] *Pomme de terre fr.* 1955, **18,** No. 186, 3-5.

rials were carried out in France to study the effect fungicides on potato yield after applying different reparations to potato crops unaffected by mildew. he varieties Viola, Bintje and Ackersegen, each own in plots at 4 localities, were treated with aptane and Zinèbe, both organic non-copper reparations, and with Bordeaux mixture. Results dicated that : (a) the organic preparations in- eased yields by 3-4% over the untreated controls;) the Bordeaux mixture lowered yields by 7-8% mpared with the controls ; (c) these differences in eld were due to a difference in size, rather than to difference in number, of the tubers produced. milar results were obtained for the different rieties, but there were some differences due to cality.—E.B.O.

46 HUNT, J. L. **'Ware wireworm.** *Fmr's Wkly* 1955, **42,** No. 9, 102-3, illus.

Vireworms have been successfully controlled by e application of the soil insecticide Aldrin at 3 lb. per acre either as a dust, an emulsion spray included in a fertilizer. For potato land, it may broadcast and worked in or applied to the open lges and furrows at planting time. Aldrin does ɔt taint potatoes or have any adverse effect on rthworms.—C.L.S.

947 THIEDE, H. Kalkstickstoff zur Düngung und Schädlingsbekämpfung. [**Calcium cyanamide as a fertilizer and for pest control (for potatoes).**] *Kartoffelbau* 1955, **6,** No. 1, 7-8, bibl. 5. [Münster]

Application, in September, of 200-300 kg. calcium cyanamide per ha. resulted in a higher percentage kill of the potato beetle [scientific name not given] than was obtained from 25 kg. DDT per ha. There was also a good herbicidal effect. Further study is required into the effect of the fertilizer on yields and starch content of the potatoes.—M.P.

948 MÜNSTER, J. and PELET, F. Le virus S et son influence sur le rendement d'une variété de pomme de terre. [**Virus S and its effect on yield of a potato variety.**] *Landw. Jahrb. Schweiz* 1954, **68,** No. 9, 931-6, bibl. 2, illus. [Sta. Féd. Essais Agric., Lausanne, Switzerland]

Yields of plants of the Bintje variety grown on different types of soil and suffering from virus S were 10-20% lower than from healthy plants on these soils. There was an increase in the proportion of small tubers (less than 35 mm. diam.) in the diseased plants.—D.B.

949 BONDE, R. **Antibiotic treatment of seed potatoes in relation to seed-piece decay, blackleg, plant growth, and yield rate.** *Pl. Dis. Reptr.* 1955, **39,** No. 2, 120-3, bibl. 4, illus. [Maine Agric. Exp. Sta., Orono]

Tests were made of the effectiveness under field conditions of Agrimycin (proprietary formulation containing 15% streptomycin + 1·5% terramycin). Healthy commercial seed was used. The seed tubers were cut and immediately treated with solutions of 100 ppm. streptomycin (9·34 oz. Agrimycin per 100 gal. water). Treatments were either instant dips, or 30 min. soaks. Controls were cut, but not treated. The 3 seed lots were then stored under farm conditions for 1-3 weeks before planting by machine. No seed-piece decay was observed in treated lots, while in untreated controls, 5-10% of setts showed evidence of bacterial invasion. Both instant-dip and soak treatments increased emergence ; emergence of treated seed-pieces ranged from 94 to 97% at 4 locations, compared with 83-90% for untreated seed-pieces. Tuber yield increases following seed-piece treatment ranged from 19 to 72 bu. per ac. In another trial, seed-pieces were soaked for 30 min. in 50 and 100 ppm. solutions of streptomycin nitrate and stored for 7 days before planting. Emergence of both treated and untreated seed-pieces was complete. The 50 ppm. treatment increased plant height slightly compared with controls and where the 100 ppm. treatment was used. The 100 ppm. treatment retarded plant growth up to 26 August, after which this effect wore off. The 50 ppm.

treatment significantly increased the number of stems per hill and the tuber yield. Tuber yields of the controls, and where 50 and 100 ppm. streptomycin nitrate were used, were 290, 384 and 353 bu. per ac., respectively.—P.J.B.

950 FRIEDMAN, B. A. **Association of internal brown spot of potato tubers with hot, dry weather.** *Pl. Dis. Reptr* 1955, **39,** No. 1, 37-44, bibl. 78, illus. [Biol. Sci. Br., Agric. Mktg Serv., U.S. Dep. Agric.]

951 HAWKES, J. G. **The ecology of wild potato species and its bearing on the origin of potato cultivation.** *J. Agric. trop. et Bot. appl.* 1954, **1,** No. 7-9, 356-8. [Birmingham Univ.]

952 GEORLETTE, R. Les espèces sauvages et semicultivées de Solanées tubérifères sud-américaines et leurs hybrides. Leur intérêt éventuel pour l'amélioration de la pomme de terre cultivée. [**Wild and semi-cultivated species of tuber-producing members of the Solanaceae and their hybrids. Their possible use in improvement of the cultivated potato.**] *Ann. Gembl.* 1954, **60,** No. 4, 246-81, bibl. 334.

The main part of this paper is the bibliography. The brief text first classifies the wild and semi-cultivated, tuber-forming members of the Solanaceae of Latin America. With an improvement programme in view, those species are named which could contribute the following characteristics : yield ; precocity ; high vitamin-C content ; abundance of flowers and fruits ; flower colour and tuber colour ; resistance to drought, cold, viruses, blight, wart disease, scab, worm infestation and the Colorado beetle.—D.B.

953 MES, Margaretha G. and MENGE, Irmgard. **Potato shoot and tuber cultures *in vitro*.** *Physiol. Plant.* 1954, **7,** No. 4, 637-49, bibl. 6, illus. [Pl. Physiol. Res. Inst., Univ. Pretoria, S. Africa]

954 BOLLE-JONES, E. W. **Nutrient levels and flower production in the potato.** *Physiol. Plant.* 1954, **7,** No. 4, 698-703, bibl. 2. [Long Ashton Res. Sta., Bristol, England]

An examination was made into the effect on flowering in potato plants of varying the amount of Fe, K, P and Ca in nutrient solutions supplied to sand cultures in which the plants were grown. Increasing the Fe supply decreased the number of flowers produced per plant, particularly where high levels of K were also present. Increasing the K supply increased flower production where low levels of Fe were present ; where high levels of Fe, or low levels of P, were present, increasing the K supply reduced flowering. Increasing the supply of Fe delayed, and shortened the duration of flowering.—From author's summary.

955 BOLLE-JONES, E. W. **The effect of varied nutrient levels on the concentration and distribution of manganese within the potato plant.** *Plant and Soil* 1955, **6,** No. 1, 45-60, bibl. 9. [Long Ashton Res. Sta., Bristol, England]

Potato plants were grown in sand culture containing different levels of Fe, K, P, $CaCO_3$ and an adequate supply of Mn. Determinations were made of the distribution and concentration of Mn in different parts of the plants during the growing season. Increasing the Fe supply decreased the Mn concentration in the laminae, stems and petioles but increased it in the roots ; Fe treatments also decreased Mn uptake. Increased K supplies increased the Mn concentration in stems and petioles and, late in the season, that in the laminae, also ; there was no marked effect on Mn uptake. Increased P supply decreased Mn uptake and concentration in laminae, stems, petioles and roots. Additions of $CaCO_3$ decreased Mn concentration in laminae and tubers. It is suggested that one of the functions of K was to increase the mobility of Mn within the plant.—From author's summary.

956 LATZKO, E. Beziehungen zwischen Cl^-— und SO_4^{--}—Ernährung, Assimilationsintensität, Enzymaktivität, Kohlehydratstoffwechsel und Qualität bei Kartoffeln. [**The connexion between Cl^-— and SO_4^{--}—nutrition, intensity of assimilation, enzyme activity, carbohydrate metabolism and quality of potatoes.**] *Z. PflErnähr. Dung.* 1955, **68,** No. 1, 49-55, bibl. 11. [Techn. Hochsch. München-Weihenstephan, W. Germany]

The daily rhythm of carbohydrate metabolism and of enzyme activity was studied in the leaves and stems of potato plants, some of which had been manured with Cl_1 (as KCl), others with SO_4 (as K_2SO_4). Plants were examined when leaf growth was near an end, for, at this stage, the daily rhythm is most marked. From chemical analyses of leaves and stems it was clear that nutrition with Cl resulted in an inhibition of the activity of the hydrolytic enzymes and hence in feeble translocation of starch. The findings explained the superiority of sulphate over chloride manuring for obtaining a high starch yield in the potato tubers. —D.B.

957 SMITH, Ora and MUNETA, P. **Potato quality. 8. Effect of foliar applications of sequestering and chelating agents on after-cooking darkening.** *Amer. Potato J.* 1954, **31,** No. 12, 404-9, bibl. 15. [Cornell Univ., Ithaca, N.Y.]

Several sequestering and chelating agents were

sprayed on potato plants in the field. Observations and Hunter Colour Difference Meter readings of boiled potatoes from these treatments indicated that several of the agents tested prevented or reduced after-cooking darkening.—From authors' summary.

958 GREIG, W. S. and SMITH, Ora. **Potato quality. 9. Use of sequestering agents in preventing after-cooking darkening in pre-peeled potatoes.** *Amer. Potato J.* 1955, **32,** No. 1, 1-6, bibl. 21. [Cornell Univ., Ithaca, N.Y.]

A 1 min. dip in a solution of 1% sodium bisulphite plus 1% sequestering agent (the di-sodium or tetra-sodium salt of ethylenediamine tetra-acetic acid) prevented completely the after-cooking darkening of pre-peeled potatoes when there was an interval of 24 hr., or more, between treatment and cooking.—E.B.O.

959 ROINE, P. and others. Askorbiinihapon määristä ja säilyvyydestä eri perunalajikkeissa. **The content and stability of ascorbic acid in different potato varieties in Finland.** *Suom. Maataloust. Seur. Julk.* 1955, **83,** 71-87, bibl. 15, illus., English summary p. 87.

Great differences were noted in the ascorbic-acid content of 58 varieties grown in the same field, the best varieties containing more than twice as much of the vitamin as the poor ones. The ascorbic acid content of 12 varieties grown at the University Experimental Farm, Viik, was determined from the crops of three successive years (1950, '-51, '-52). It was established that Siikli (Sieglinde) was the best in each year, Rheingold and Eigenheimer were also always near the top of the list, whilst Aquila and Franz were regularly the poorest. The results indicate that the ascorbic-acid content is a permanent characteristic of a potato variety. The stability of the ascorbic-acid content was studied with the Viik and Tuusula varieties, estimations being made five times during the storage period. The greatest decrease in the ascorbic-acid content was observed during the first 3-4 months ; after 6·5 months no marked decrease could be observed. In 8·5 months a total of about 49% had disappeared. A part of it had, however, changed into dehydroascorbic acid, the total loss of the vitamin C activity being thus smaller, approximately 40%. The higher the original content of ascorbic acid had been, the faster was the loss. Later on, the differences between varieties progressively diminished but could still be noted at the end of the storage period.—From authors' summary.

960 TIZIO, R. M. and others. Verificación de la ' degeneración ' de la papa por efecto de las altas temperaturas. [**Determination of the degree of degeneration in potatoes by their reaction to high temperatures in storage.**] *Rev. Invest. agric., B. Aires* 1954, **8,** No. 3, 255-61, bibl. 6.

An experiment to determine whether degeneracy of potato clones could be assessed by means of tests involving storage at high temperatures was carried out in 1952-3. Two groups of Katahdin potatoes were used. Group 1 had been grown 5 times in Argentina and stored in clamps after each harvest. Group 2 had been grown twice in Argentina and stored in a refrigerator after each harvest. The two groups, uniformly sprouted, were subjected to the following storage treatments for 42 days before being planted : (a) low temperature with continuous darkness, (b) low temperature with natural light, (c) high temperature with continuous darkness, (d) high temperature with natural light, (e) normal conditions in a clamp. The low and high temperatures were 7°C. and 27·5°C., respectively. The tubers were planted on 7 November, 1952, and the crop harvested on 22 April, 1953. When the seed potatoes were stored in a clamp (e) Group 2 yielded significantly more than Group 1. High temperatures, (c) and (d), reduced the yields of Group 2 by 25% compared with low temperatures, (a) and (b), but in the case of Group 1 the reduction was only 8%. Thus the yields of Group 1 (assumed to be the more degenerate of the 2 groups) were less markedly affected by high temperatures in storage than were the yields of Group 2. In the case of potatoes stored at low temperatures, those treated with natural light (b) gave significantly lower yields than those stored in darkness (a). This effect was more marked in Group 1 than in Group 2.—W.J.B.

961 POHJAKALLIO, O. and others. **Frost resistance of potato tubers.** *Suom. Maataloust. Seur. Julk.* 1955, **83,** 48-62, bibl. 18, illus. [Dep. Pl. Path., Univ. Helsinki]

The results of these investigations are compatible with the view that the effect of temperature on the sugar content of the potato tuber is not a function of respiration only, but depends in the main on the action of the hydrolysing enzymes. In the frost-hardening of potato tubers, the formation of substances which bind water more strongly than does osmosis may be of essential significance.—From authors' conclusions.

962 RAUTER, R. Stickstoffdüngung und Stärkeertrag. [**Nitrogen manuring and starch yield.**] *Kartoffelbau* 1955, **6,** No. 3, 48-9. bibl. 2. [Oldenburg, W. Germany]

The paper, which is of interest to growers of potatoes for fodder and for industrial use, gives the increase in starch yield obtained by manuring with ammonium sulphate. Using, chiefly, the variety Ackersegen, an application of 4-5 dz./ha. $(NH_4)_2 SO_4$ produced an increase in starch yield of

15-16 dz./ha. This corresponded to an increase of 16-18 kg. starch for 1 kg. pure N per ha. [1 dz. = 100 kg.]—D.B.

963 SELMAN, I. W. and DURHAM, V. M. **A comparison of the effects of organic and inorganic fertilizers on the growth and yield of potatoes.** *Emp. J. exp. Agric.* 1954, **22,** No. 88, 314-22, bibl. 4, illus. [Wye Coll., Univ. London]

The growth of the shoot and the yield of the potato variety King Edward VII were studied for 4 years in small field plots supplied with organic manures, commercial inorganic fertilizers, or a mixture of the two. When the plants were small, and N, P and K did not limit growth, no definite evidence could be found of some special beneficial effect of compost. Abnormally heavy dressings of inorganic fertilizers (up to 2 tons per ac.) resulted in a temporary check to growth of young plants. Analyses of leaves and tubers showed that plants receiving compost had a lower N content than plants receiving inorganic fertilizers, and this resulted in a premature check to growth and a lower yield. When compost was supplemented with hoof-and-horn meal, the differences between treatments for stem height, and for yield and uptake of N, P and K by the tubers was slight.—From authors' summary.

964 FISCHNICH, O. Einfluss von Kunstlicht auf die Lagerung und Vorkeimung von Pflanzkartoffeln. [**The influence of artificial light on storage and sprouting of seed potatoes.**] *Kartoffelbau* 1955, **6,** No. 2, 32-7, bibl. 15, illus. [Forschungsanst. für Landw., Braunschweig-Völkenrode]

The use of artificial light is discussed. The degree of control and inhibition of sprouting was found to be dependent on temperature, humidity and the duration of illumination during storage, and could be adjusted for individual varieties in order to obtain tubers with short, healthy sprouts. The appearance of the sprouted tubers of the many varieties used, after 4 months of such over-winter storage, is illustrated. It was found possible to obtain tubers suitably sprouted for planting as late as mid-July. On taking the tubers out of the clamp in March any long shoots which had developed were removed. The tubers were then artificially illuminated and the storage conditions were varied to obtain and maintain short, healthy sprouts for the required planting time. Field trials with 4 potato varieties showed that yields obtained from tubers stored all winter in artificial light, or in the dark and then in daylight, were significantly higher than from tubers which had been stored and allowed to sprout entirely in the dark.—M.P.

965 RAO, S. N. and WITTWER, S. H. **Further investigations on the use of maleic hydrazide as a sprout inhibitor for potatoes.** *Amer. Potato J.* 1955, **32,** No. 2, 51-9, bibl. 9, illus. [Michigan Agric. Exp. Sta., East Lansing]

Results from plot trials, in which potato plants of several varieties were sprayed with maleic hydrazide, indicated that the effectiveness of this treatment for retarding sprouting in storage is dependent upon the time of application, and is influenced greatly by variety. Maleic hydrazide should be applied to the green foliage 1-2 weeks after flowering and approximately 6 weeks before harvest.—E.B.O.

966 PÄTZOLD, C. Ein neuartiger Hemmstoff. [**A new type of (growth) inhibitor.**] *Dtsch. landw. Pr.* 1954, **77,** No. 24, 339-40, illus. [Forschungsanst. für Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

Treatment of root and tuber crops with maleic hydrazide [MH] to prevent sprouting was studied in potato, artichoke, fodder- and sugar-beet and other plants. Potato. It is difficult to give specific recommendations regarding time of treatment because results depend on the variety used, weather and manurial treatment. The variety Vera was satisfactorily treated by spraying the plants with a 0·2-0·4% MH solution applied at 600 l./ha. Direct treatment of the tubers, stored in a not too dry atmosphere, with a 0·5-1·0% solution was successful; treatment with MH powder was not. Jerusalem artichoke. Direct spraying of the tubers in spring with 0·2-0·4% MH gave better results than treatment of the crop in autumn. Fodder- and sugar-beet. Spraying of tops or roots inhibited sprouting but, as yet, no specific recommendations can be made.—D.B.

967 ANDRÉN, F. Försök med antigroddpreparat för lagring av potatis. [**Trials with sprout inhibitors for the storage of potatoes.**] *Växtskyddsnotiser* 1954, No. 4, 60-1.

The results are given of trials in Sweden during 1953-4 on the use of IPC preparations for sprout inhibition in stored potato tubers. Lots of 50 and 100 kg. tubers were treated with 1, 1·8, 2·5, 3·5 and 4 g. IPC per 100 kg. The storage period was from 22 December, 1953 to 2 July, 1954. All rates of IPC treatment (as Potifar M) gave substantially the same results, whether the tubers were stored in closed or in open boxes. In no case was sprout growth more than 100 g. in weight per lot. In further trials, the IPC-containing materials Aaservo and Tuburite and Potifar-Fusarex (containing IPC + TCNB) were used. Results with both Aaservo and Tuburite were entirely satisfactory. Results with Potifar-Fusarex were somewhat variable, possibly due to ventilating the storage boxes.—P.J.B.

968 HANSEN, F. Forsøg med anvendelse af spirehemmende midler ved opbevaring af

kartofler. [**Trials on the use of sprout-inhibiting chemicals for the storage of potatoes.**] *Beret. 489. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl.* 1954, **58,** No. 2, 185-239, bibl. 12, English summary pp. 231-2.

ials were carried out in Denmark during 1950-3 the use of sprout-inhibiting chemicals for tatoes stored in clamps. Storage periods were : autumn (September/October)-summer (June), autumn-spring (March) and (c) spring-mmer. Potatoes were also stored in houses at one ation from autumn to spring. The varieties ntje, Majestic and Up-to-date were used and out 1000 kg. were stored in each clamp. Sprout ibitors used (at recommended rates) included sarex (TCNB), Spika (MENA), Dorman (MENA) d Belvitan K (naphthyl-alkyl-ether), with most phasis on Fusarex. Storage conditions in all 3 al years were poor, owing to the prevalence of ghted tubers. Results indicated that Fusarex s effective as a sprout-inhibitor in all trials. lvitan K was similar to Fusarex, while Spika d Dorman were rather less effective under atment (c). Given satisfactory storage conditions, e proportion of diseased tubers where Fusarex s used was similar to that where the tubers were treated ; under poor storage conditions, Fusarex reased the incidence of rotting. Under treatment , however, the use of Fusarex resulted in a lower idence of diseased tubers, while the other terials had no effect on rotting. Fusarex effec-ely prevented sprouting during storage from tumn to spring in storage houses and had no ect on storage losses or disease incidence. The idence of diseased tubers was increased by stor-; the tubers in the field for one month in small mps, before treatment and storage in large mps. Fusarex-treated tubers sprouted some ys later than untreated tubers. [No reference made to possible tainting.]—From author's mmary.

WEET-POTATOES

9 HASSELL, O. L. **Sweet potatoes growing in Queensland.** *Qd agric. J.* 1955, **80,** No. 1, 3-16, illus.

account is given of the cultivation of sweet-tatoes in Queensland. The varieties described clude ; White Maltese, Abundance, Brooks' m, Louisiana No. 9, and Porto Morada.—M.P.

0 POOLE, C. F. **The sweet potato in Hawaii.** *Circ. 45. Hawaii agric. Exp. Sta.* 1955, pp. 14, bibl. 3, illus.

ecommendations are given for the cultivation of e sweet-potato [*Ipomoea batatas*] in Hawaii, with rticular reference to methods of curing and storage. New varieties produced in Hawaii during recent years include HSPA 3, a dry-fleshed variety, and Onolena and HES 12, moist-fleshed varieties. —P.J.B.

971 DE LA HUERTA, A. and NAVARRO, E. Variedades de batatas. [**Varieties of sweet-potatoes.**] 1954, pp. 53, illus., Madrid; Inst. Nac. Invest. Agron.

26 varieties of sweet-potato grown in southern Spain are described under the heads : type of leaf, type of root, yields of leaf and root, chemical analysis of the root. There are photographs of the leaf and root of each variety described.—W.J.B.

972 INSTITUT NATIONAL POUR L'ÉTUDE AGRONOMIQUE DU CONGO BELGE. Rapport annuel pour l'exercice 1953. [**Annual report for 1953.**] 1954, p. 89.

In a preliminary trial of methods for the rapid vegetative reproduction of the sweet-potato [*Ipomoea batatas*], fresh tubers of different sizes, dusted with Ceresan at .1 part per thousand, were placed in nursery beds at the rate of 10 kg. per sq. m., on a substratum of fresh compost, white sand or forest earth, 20-25 cm. deep, and covered with a layer, 9 cm. deep, of sand or earth. Results showed an average of 158 plantlets per sq. m. from Ceresan-treated tubers, as against 25 in the untreated control. The emergence of new plants was negligible after 45 days. The best results, 302 plants per sq. m. after 45 days, were obtained by planting medium-size tubers on white sand.—E.B.O.

973 ALBERT, W. B. **Tolerance of transplanted sweet potatoes to several herbicides under low soil moisture conditions.** *Proc. 7th South. Weed Conf. 1954* 181-4, bibl. 4. [S. Carolina Agric. Exp. Sta., Clemson]

In trials in S. Carolina, pre-emergence applications of 6 herbicides which are absorbed principally from the soil, were sprayed in bands, 14 in. wide, over transplanted sweet-potato sprouts. Soil moisture during these trials was low, except at the beginning and the end of the season. Mean sweet-potato yields were significantly reduced following treatment with 9 lb. per ac. CMIPC (isopropyl-N-2 methyl-5 chlorophenyl carbamate), 6 lb. CIPC, 6 lb. Alanap 5 (mixture of N-1 naphthyl phthalamic acid and N-1-naphthyl phthalamide), 1·5 lb. CMU, 1·5 lb. D (3-(3,4-dichlorophenyl)-1, 1-dimethyl urea) and 1·5 lb. M (1-(3,4-dichlorophenyl) -3-methyl urea). These rates per acre are expressed on a broadcast basis. Applications of 6 lb. CMIPC per ac. resulted in considerably less yield reduction than the other treatments ; total yields following this treatment were 143 bu. per ac., compared with 162 bu. per ac. for controls. The low soil-moisture content appeared to prolong the residual effect of the herbicides.—P.J.B.

974 AVILA, A. Principales componentes químicos en una colección de batatas dulces. [**Principle chemical constituents of sweet-potatoes.**] *Idia* 1954, **77,** 6-9, bibl. 7. [Inst. Fitotec., Argentina]

The chemical composition of a collection of sweet-potato (*Ipomoea batatas*) varieties was determined and the results are tabulated. There were wide differences between varieties in carbohydrate contents, which varied from 18 to 36·5%. The content of saccharose varied between varieties from 2·6 to 5·9%.—W.J.B.

CASSAVA

975 MIÈGE, J. and OBATON, M. Comportement anormal de la tubérisation chez un clone de manioc. [**Abnormal tuber formation in a clone of cassava.**] *J. Agric. trop. et Bot. appl.* 1954, **1,** No. 10-12, 407-13, illus. [Inst. Enseign. Rech. Trop., Adiopodoumé, Ivory Coast]

The cassava (*Manihot utilissima*) variety H 31, which is grown successfully in Madagascar, is not adapted to the environment of the coastal areas of the Ivory Coast. When grown there, it showed poor vegetative development and abnormal tuber formation, which is described.—E.B.O.

MANGELS

976 MANNER, R. Hammenhögs Kofor Barres. [**Hammenhög's Kofor Barres mangel.**] *Medd. 10-11. Gullåk Växtförädl. Anst.* 1954, 293-9, illus., English summary p. 299.

Hammenhög's Kofor Barres mangel was selected from Hammenhög's Original Barres, compared with which it has a fuller and less fangy root of a darker red colour. In trials at Gullåker during 1944-52, mean dry-matter yields of the roots of Slättbo II, Hammenhög's Original, Halvlång, Svea and Kofor Barres mangels were 84·3, 86·6; 81·6, 82·8 and 90 deciton [100 kg.] per ha., with dry matter contents of 13·1, 12·9, 12·2, 12·2 and 13·4%, respectively. Yields of tops of these varieties during 1949-52 averaged 236, 246, 211, 210 and 245 deciton per ha., respectively, and percentages of dry matter remaining in the roots during storage from the end of October to March were 75·5, 79·1, 75·6, 70·6 and 79·9%, respectively. Kofor has very little tendency to bolt.—P.J.B.

TOPINE

977† THE FARMER'S WEEKLY. **Topine progress report. Company formed to promote new crop.** *Fmr's Wkly* 1955, **42,** No. 15, 75, illus.

The membership and objects of a new compan formed for the development of topine [see *F Crop Abstr.* 5 : 1405] is given, together with co ditions governing the sale of seed and a list of so official bodies in the U.K. which have received see tubers for trial. Silage made from the tops October, 1954, had a D.M. of 15·3% and a cru protein in the D.M. of 11·5%. Tubers had a D.M of 16·3% and a crude protein in the D.M. of 4·2% —C.L.S.

FIBRE CROPS

COTTON

978 NICHOLSON, G. E. **A general survey of cotto production in Ethiopia and Eritrea.** *Em Cott. Gr. Rev.* 1955, **32,** No. 1, 1-18, bibl. 4 illus.

It is estimated that there are about 17 million a in Ethiopia on which cotton could be grown. I general these potential cotton-growing areas li below an altitude of 6000 ft. a.s.l. and have a annual rainfall of 30-50 in. It is estimated that, the 17 million ac., 2 to 3 million ac. could be mad available for cotton-growing without disturbin the present level of food production. An attempt made to assess the cotton-growing possibilities the different regions of Ethiopia and Eritrea. Poo communications are an obstacle to the productio of cash crops. Large quantities of raw and manu factured cotton are at present imported int Ethiopia.—W.J.B.

979 GHAZANFARULLAH KHAN, S. M. **Mechanize cultivation of cotton in Pakistan.** *Pakis Cott. Bull.* 1954, **3,** No. 1-2, 15-21.

The system of cotton-growing employed on 6000 ac. irrigated farm, the largest fully-mechan ized farm in Pakistan, is described. The 3-cours rotation is: cotton (June-January)/wheat (October April)/green manure. The green manure is sow soon after the disc-ploughing which is ca ried out immediately after the wheat harvest Green-manure crops are also broadcast over th cotton crop in September. When cotton-picking finished (in January) the leguminous green crop disced into the soil with the cotton stalks. Plough ing, seed-bed preparation and sowing, and inter-ro cultivations are carried out mechanically. Pickin is by hand. Costing of operations has shown th economic advantages of mechanization on thi farm.—W.J.B.

980 KOSOV, V. [**Development of cotton productio in the USSR.**] [Russian] *Soc. seljs. Hoz (Social. Agric.)* 1955, **26,** No. 2, 57-72.

The history of cotton-growing in Russia, from th 1880 decade onwards, is discussed with specia

ference to : the initiation of Machine Tractor tations in cotton regions during 1930, the develop- ent of cotton production under irrigation in the ifferent Republics of Soviet Central Asia during 945-54, labour problems and use of the square- ocket method of sowing by which expenditure on and labour is reduced.—M.H.

81 BROWN, L. C. and HYER, A. H. **Chemical defoliation of cotton. 3. A study of seed and fiber from cotton plants treated with amino triazole.** *Agron. J.* 1954, **46,** No. 12, 580-1, bibl. 4. [Fld Crops Res. Br., U.S. Dep. Agric., U.S. Fld Sta., Sacaton, Ariz.]

n two experiments on irrigated cotton in Arizona 1952-3, different defoliant treatments, including 25, 0·5 and 1 lb. per ac. amino triazole, alone, or mbined with 8 lb. Aero Cyanamid Soluble (85% nonosodium cyanamide), or 8 lb. Aero Cyanamid oluble, alone, were given either to the whole ants, or as bottom-leaf treatments. The treat- ents caused no significant effect on cotton-seed rmination, boll size, lint percentage, seed and nt indices, number of seeds per boll, number of olls per lb., or on length, strength, or fineness of ore.—P.J.B.

82 MAKSIMENKO, I. K. [**A cotton variety which sheds its leaves.**] [Russian] *Priroda, Moskva* (*Nature, Moscow*) 1955, **44,** No. 2, 98-100, illus. [Inst. Agric., Turkmenian SSR]

he variety 8704 I is described and illustrated. originated from a cross between two types of *ossypium barbadense*, and has the merit of shedd- g its leaves from the fruiting branches about 7 days before boll opening. When 50% of the olls have opened (second half of September), there main only a few leaves on the upper branches of ie plant. It is recognized that boll opening is ccelerated in those plants which shed their leaves nd this shedding facilitates harvesting.—M.H.

83 MUSINA, G. [**Effect of pre-sowing treatment of cotton seeds on their sowing qualities.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1955, **4,** No. 1, 21-4.

resowing treatment of cotton seed with different nosphorus compounds was carried out in labora- ry and field tests during 1952 and 1953. Seed of ie cotton variety 611-b was sown in six-rowed ots of 195-312 sq. m. (4 replications). In Pre- ninary tests it was determined that concentra- on of the salts in water should be 0·25% and ration of soaking 24 hours. The compounds used r seed treatment included ammophos (NH_4H_2- O_4) and, for comparison, ammonium nitrate and lphate of ammonia. The controls were : (1) routed seed which had been soaked in water and bsequently treated with formalin ; (2) dry seed eated with Granosan (NIUIF-2), 10 kg. of the compound per 1 ton (1000 kg.) of seed. The procedure for soaking seed in the salt solutions was as follows : after the seed had been warmed in sunlight for a few days and subsequently treated with formalin (1 : 90), the sample was soaked in a 0·25% solution of one of the above salts for 24 hr. at 10-20°C. The data show that treating seed with ammophos gave the best results, raw-cotton yield per plant being 36 g. compared with 19·25 g. in the ammonium sulphate test, 25·9 g. in the test where seed was soaked in water, and 28·9 g. for the ammonium nitrate test. Field experiments confirmed these results. Subsequently, tests were made to determine the most satisfactory method of treating the seed with ammophos in order to secure not only early, good harvests but also healthy seedlings. The data show that the best measure is to dust the seed with ammophos [quantities not mentioned], then to treat with Granosan ; if seed is first soaked in a solution of ammophos, then the Granosan penetrates the moist seed-coat and adversely affects germination.—M.H.

984 REA, H. E. **Control of trumpet vines on cotton farms.** *Proc. 7th South. Weed Conf. 1954* 51-2. [Texas Agric. Exp. Sta., College Station]

A number of herbicides was used as spot-treatments for trumpet vines (*Tecoma radicans*) in cotton fields in Texas. Applications of solutions of 8 oz. Crag Herbicide No. 1 (Na, 2,4-dichlorophenoxyethyl sulphate) in 1 gal. water, to trumpet-vine stems and to the soil immediately adjacent to the stems on 8 June, followed by removal of the plant tops, resulted in 90% suppression of re-sprouting on 28 July and effective growth suppression during the rest of the season. Cotton plants adjacent to treated trumpet vines were seriously injured by the treatments. Natrin (2,4,5-trichlorophenoxyethyl sulphate) and Silvex 2 (2,4,5-trichloropropionic) acid were also effective for suppressing re-sprouting of trumpet vines and did not affect adjacent cotton plants. The removal of the tops of the vines appeared to be necessary for effective control.—P.J.B.

985 REA, H. E. **Control of established Johnson grass in cotton fields.** *Proc. 7th South. Weed Conf. 1954* 59-61. [Texas Agric. Exp. Sta., College Station]

The results of spot-oiling of established Johnson grass [*Sorghum halepense*] crowns in cotton showed that 4-5 repeated applications of a number of oils reduced stands by up to 98% during the season. Four to five hoeings seldom affected stands. The addition of PCP or DNOSBP to the oils did not appear to increase their effectiveness materially ; however, the use of hexachloracetone, used with oils in a ratio of 1 part hexachloracetone per 31 parts oil, very considerably increased the her-

bicidal effectiveness of the treatments. The residual effect of hexachloracetone was slightly injurious to cotton adjacent to treated spots. In pre-season treatments to control thick stands of Johnson grass, autumn applications of 50 lb. TCA on tilled land has reduced stands by 95% with no injury to the following cotton crop.—P.J.B.

986 WEED, M. B. and others. **Substituted ureas for pre-emergence weed control in cotton.** *Proc. 7th South. Weed Conf. 1954* 68-87, bibl. 4. [Grasselli Chem. Dep., E.I. Dupont de Nemours & Co., Wilmington, Del.]

The results are given of trials to compare CMU with 3-(3,4-dichlorophenyl), 1, 1-dimethylurea (D) as pre-emergence treatments made to cotton in Texas, Louisiana and N. Carolina. The herbicides were applied at rates ranging from 0·25 to 2 lb. per ac. At equivalent rates of treatment, the dichloro compound gave better weed control than CMU and the margin of safety in its use was better. Liquid and wettable powder formulations were of equal effectiveness In further trials in a number of cotton-growing States of the USA, both compounds were applied at rates of 1·2-1·6 lb. active material per ac. to cotton at, or just after, sowing. Mean weed control following the 1·2 lb. rates of application of CMU and the dichloro compound was 82 and 90%, and, following the 1·6 lb. per ac. rates, 93 and 97%, respectively. The results showed that the dichloro compound caused less injury to the cotton than CMU at equivalent rates of treatment, they had an adequate margin of safety for use in commercial practice and had no adverse effects on re-sown cotton. Observations are also made on the persistence of these herbicides in the soil. It is concluded that the dichloro compound is preferable to CMU as a pre-emergence treatment for cotton and that a rate of 1 lb. per ac. should be used in practice.—P.J.B.

987 ALBERT, W. B. and ANDERSON, J. H. **Comparative tests of CMU, D, M, and CIPC as pre- and post-emergence herbicides in cotton.** *Proc. 7th South. Weed Conf. 1954* 88-92. [S. Carolina Agric. Exp. Sta., Clemson]

Comparisons were made of CIPC, CMU, 3-(3,4-dichlorophenyl)-1,1-dimethylurea (D) and 1-(3,4-dichlorophenyl)-3 methyl urea (M) as herbicides for cotton. In pre-emergence trials, the herbicides were applied immediately after sowing on 23 April. During 25 April-6 May, 4·25 in. rain fell. The post-emergence treatments were made on 22 May either as overhead, or as directed sprays. At rates of 1 lb. per ac., pre-emergence treatments with both dust and liquid formulations of CMU, D and M were less effective than 6 lb. CIPC per ac. for controlling crabgrass [*Digitaria* sp.], but slightly more effective for controlling broad-leaved weeds. At rates of 2 lb. per ac., CMU, D and M were more effective than 6 lb., CIPC per ac. against broad-leaved weed and equally effective against grass weeds. At 4 lb per ac., CMU, D and M gave complete control o all grasses and almost all broad-leaved weeds ; n injury to the seedling cotton plants was caused b this rate of treatment. Overhead post-emergenc treatments injured cotton seedlings (3- to 4- lea stage) and failed to control established weeds Directed post-emergence treatments did not injur the cotton seedlings, but failed to control estab lished weeds.—P.J.B.

988 FOY, C. L. and others. **Comparative efficiency of CMU and other residual type herbicides applied at lay-by for late season weed contro in irrigated cotton.** *Proc. 7th South. Weed Conf. 1954* 93-6, bibl. 8.

Weed control in irrigated cotton is a serious problem in California during the time from the last cultivation, to harvesting. In the trials reported, CMU, DNOSBP, $NaClO_3$, CIPC and isopropyl N-(3-methylphenyl) carbamate (T-516) were applied in 100 gal. spray volume at lay-by (20 August). Weeds present consisted mainly of *Eragrostis* spp. All materials, except T-516, gave highly significant control of weeds, but CMU at 1·5 and 3 lb. per ac. was considerably better in this respect than the other materials, followed by DNOSBP at 12 lb. per ac. CMU was the only material which produced symptoms of injury in the cotton, but had no significant effect on yields. CMU appeared to be moved more slowly by irrigation water than the other materials, though weed control was markedly better where irrigation was done every 8 days, rather than every 4 days. Application of 4 lb. CMU reduced cotton yields slightly and there was some evidence that applications of 3 lb. per ac. caused fibre immaturity.—P.J.B.

989 ARLE, H. F. and EVERSON, E. H. **The control of annual morning glory and summer grasses in cotton with CMU.** *Proc. 7th South. Weed Conf. 1954* 101-4. [Agron. Dep., Univ. Arizona]

In two years' trials in Arizona on the control of annual morning glory (*Ipomoea hirsutula*) and grasses in cotton after lay-by, CMU at 1-4 lb. per ac. gave better weed control than a number of other materials used. In further trials, applications of 0·5, 1, 2 and 4 lb. CMU per ac. were made to the varieties Acala 44 and Cal. 4-42 on 8 and 19 June, 9, 22 and 27 July. On 8 June, the plants were in the early square stage, 22 July was prior to the final cultivation. Non-replicated treatments were also made on 11 May (seedling stage, 3 weeks after sowing). Following the 11 May treatments, all rates of CMU caused chlorosis ; chlorosis was slight following applications of 1 lb. CMU per ac., and severe following 4 lb. per ac. The 4 lb. rate also caused considerable stunting and killed a number of

plants. There was a loss of residual toxicity of CMU later in the season. The effects of CMU on the plants following the late treatments was similar to that following the 8 May treatments. Chlorosis in the plants continued for 3-6 weeks following the first irrigation after treatment. The 4 lb. CMU per ac. treatments caused definite reductions in boll numbers. Rates of 1 lb. CMU per ac. gave satisfactory control of grasses, whether applied before or after the final cultivation. Rates of 1 or 2 lb. CMU caused no serious reductions in cotton yields. Rates of 1 lb. CMU per ac. gave satisfactory control of *I. hirsutula*, while rates of 2 lb. per ac. gave almost complete control. CMU at the rates used had no deleterious effects on cotton fibre quality. The soils used in these trials were clay loess ; on light, sandy soils, these rates of CMU caused severe injury to the cotton.—P.J.B.

990 NORMAND, W. C. **A study in the interactions of cotton varieties and pre-emergence herbicides.** *Proc. 7th South. Weed Conf. 1954* 129-33. [Louisiana Agric. Exp. Sta., Baton Rouge]

Greenhouse and field trials were carried out to determine the susceptibility to injury of 13 different varieties and strains of cotton to DNOSBP and CIPC applied at 6, 9 and 12 lb. per ac. and to CMU and 3-(3,4-dichlorophenyl)-1,1-dimethylurea (M). The results did not indicate any differences between the reactions of the varieties except to DNOSBP.—P.J.B.

991 SZUMKOWSKI, W. Recomendaciones para el combate de plagas del algodonero, segun los resultados de los estudios biologicos. [**Recommendations for the control of cotton pests, following biological studies.**] *Agron. trop., Maracay* 1954, **3,** No. 4, 273-90, bibl. 9, English summary pp. 288-9. [Div. Ent. Zoo., Inst. Nac. Agric., El Limón, Maracay, Venezuela]

As a result of studies made at the Institute, recommendations are made for the control of certain insect pests of cotton, bearing in mind their life-cycles and the necessity to avoid, as far as possible, the destruction of predators. For the control of *Alabama argillacea*, Endrin or 20% Toxaphene should be applied to infected parts of the field. To obtain maximum control of *Sacadodes pyralis* early-maturing cotton varieties should be used. Sowing should be arranged to take place within a period of 7-15 days and should take place at the same time over a whole region. Defoliants should be applied to hasten maturity in the case of dangerous infestations. Stalks of harvested crops should be destroyed immediately. The eggs of *Sacadodes pyralis* (just before hatching), and also newly hatched larvae, can be treated with Endrin. For *Heliothis armigera* and *H. virescens* the same non-chemical methods of control as for *Sacadodes pyralis* should be applied. Successful chemical control of *H. armigera* and *H. virescens* is obtained by the use of 10% DDT and 20% Toxaphene dust on infested parts of the field, preferably when the eggs are hatching. Chemical control of *Anthonomus grandis* is obtained by the use of Endrin, 20% Toxaphene or 2·5% Aldrin.—W.J.B.

992 SIMON, J. E. El sembrio de maíz intercalado en los algodonales. Experiencias en el Valle de Ate para el control del *Heliothis virescens*. [**Experiments in the Ate Valley on the control of *Heliothis virescens* in cotton crops by means of inter-sowing with rows of maize.**] *Bol. Trim. Exp. Agropec., Lima* 1954, **3,** No. 2, 16-28.

Numerous examples are given of the control of *Heliothis virescens* in cotton by inter-sowing with maize. The cases quoted are from cotton-growing estates in the Ate Valley, Peru. The maize plants attract *H. virescens* and are also breeding grounds for certain insects of the families Anthocoridae and Miridae, which are predators of *H. virescens*. Single rows of cotton are sown at intervals of 7 maize rows. Instructions are given for the modification of the intervals to suit various systems of cultivation. The best control of *H. virescens* is obtained when maize is sown at the same time as cotton. Insecticides, which are likely to damage the predators, should not be employed when this system of insect-control is used. Cases are quoted of cotton-growing areas, previously subject to heavy attacks by *H. virescens*, where high yields of cotton have been obtained by inter-sowing cotton with maize. —W.J.B.

993 MCGREGOR, S. E. and others. **The role of honey bees in cotton pollination.** *Agron. J.* 1955, **47,** No. 1, 23-5, bibl. 13. [Ent. Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

The trials reported were carried out in 1952 to investigate the possibility of using honey bees (*Apis mellifera*) to obtain adequate cross-pollination in the field for the production of hybrid varieties. Plots of *Gossypium hirsutum*, each containing 4 varieties, including the commercial variety A-44, or containing 2 varieties, including the commercial variety Pima S-1, were established and certain blocks were caged either to exclude or include honey bee colonies. Pima S-1 cotton plots exposed to bee pollination, yielded 24·5% more seed cotton than similar plots from which pollinating insects were excluded ; this yield increase was caused by a highly significant increase in weight of bolls, seed and lint and number of seeds per boll. With A-44, no increase in yields resulted, but the use of bees resulted in an earlier crop. The use of bees also resulted in a substantial degree of hybridization. —P.J.B.

994 GOODMAN, A. **The effect of cloudiness upon the shedding of fruiting points from cotton at Tokar Delta.** *Emp. Cott. Gr. Rev.* 1955, **32,** No. 1, 24-30, bibl. 6, illus.

Experiments were carried out to determine whether the heavy loss of cotton fruiting-points by shedding (65-70%) in the Tokar Delta area, Sudan, were to be attributed to insect damage or to the cloudiness prevalent in the region. In 1952-3, observations of the shedding of fruiting-points were made on unsprayed plots and on plots sprayed fortnightly with DDT to keep the plants insect-free. There were no marked differences in either the amount or time of shedding between the sprayed and unsprayed plots. In a further experiment in 1953-4, selected groups of healthy plants of 6 varieties were walled off for observation. The shed fruiting-points were collected and counted daily. There was a close correlation for all varieties (demonstrated by graphs) between the occurrence of peaks of cloudiness and peaks of shedding. The peaks of shedding occurred 2-4 days after the peaks of cloudiness and the number of days elapsing between the occurrence of cloudiness and the shedding of fruiting points varied with variety.—W.J.B.

995 MARSH, P. B. and others. **The effect of weathering prior to harvest on certain properties of cotton fiber.** *Pl. Dis. Reptr* 1954, **38,** No. 2, 106-19, bibl. 17, illus. [Agric. Res. Serv., U.S. Dep. Agric.]

996 GREEN, J. M. and STROUP, G. E. **Quality of Oklahoma cotton as influenced by lint coarseness.** *Bull. B-442. Okla. agric. Exp. Sta.* 1954, pp. 11.

Data are given of the lint coarseness values of cotton varieties grown in Oklahoma, as measured by a Micronaire air-flow instrument.—P.J.B.

997 CHRISTENSEN, P. D. and LYERLY, P. J. **Yields of cotton and other crops as affected by applications of sulfuric acid in irrigation water.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 4, 433-6, bibl. 12, illus. [Texas Agric., Exp. Sta., College Station]

Following reports of increased crop yields on alkaline soils following soil acidification, trials were carried out over a 6-year period in Texas on cotton grown on a calcareous soil (pH 8·3-8·6), irrigated with water containing no acid (pH 8·3) and water acidified with H_2SO_4 to pH 6 and pH 2·3. Cotton was grown for 5 years continuously, followed by one season under sesbania. The first-year yields of seed cotton grown after using irrigation water with no acid and water acidulated to pH 6 and 2·3, were 2959, 2879 and 2888 lb. per ac. and in the 6th year, 2164, 2173 and 2309 lb. per ac. ; sesbania yields (green weight) after 5 years' cotton were 8752, 9665 and 11,324 lb. per ac., respectively. With the exception of the second and last years in which cotton was grown, acidulation of the irrigation water resulted in a progressive yield increase compared with controls irrigated with non-acidulated water. Cotton yields on the acidulated soil were significantly higher than those of cotton on non-acidulated soil in the 4th year, only. The use of acidulated water did not appear to be economically feasible.—P.J.B.

998 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations. Season 1953-4. Aden Protectorate.** 1954, pp. 5.

INVESTIGATIONS REPORTED:

Cotton varietal trials. By R. R. Anson, p. 3. Egyptian strains were sown at a spacing of 1 m. × 1 m. and American varieties at 1 m. × 50 cm. The plants in the trial were not attacked by wilt. The four highest-yielding varieties were Bar 12/3, Bar XL-3, Wild's Early and Karnak, which yielded 862, 848, 847 and 801 lb. lint per ac., respectively. In the case of American varieties, 2 crops per season were obtained, one from primary and one from secondary growth.—W.J.B.

999 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations. Season 1953-4. Anglo-Egyptian Sudan.** 1954, pp. 22.

INVESTIGATIONS REPORTED :

1. Observation of varieties of American-type cotton grown under irrigation at the Gezira Station. By M. F. Rose and others, pp. 9-10. Nine varieties were grown, including Sudan rain-fed types and introductions from abroad. As a result of the trial, only 3 varieties, Punjab 268F, Hopi Acala and Bar 11/7, were considered worth a further test.

2. Cotton variety trials at Kadugli Station. By M. F. Rose and A. Low, pp. 18-20. The trial took place at 4 centres. Bar 7/8·1 gave the best general performance and significantly outyielded Bar SP84 at all centres.—W.J.B.

1000 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations. Season 1953-54. Nyasaland.** 1954, pp. 9.

INVESTIGATIONS REPORTED :

1. Cotton variety trials. By H. C. Ducker, pp. 3-5. Of the locally bred strains on trial, CL 20 gave highest yields of seed cotton per ac. in most localities, especially when the seed was dusted with Perenox before sowing.

2. Sowing and weeding trial. By H. C. Ducker, p. 8. Delayed sowing reduced yields in all localities ; yields were further reduced if clean weeding was delayed for 10 days.—M.P.

1001 EMPIRE COTTON GROWING CORPORATION.

Progress reports from experiment stations. Season 1953-54. West Indies. 1954, pp. 19.

INVESTIGATIONS REPORTED :

1. Manuring and spacing trial, St. Vincent, pp. 4-5. Pen manure at 20 tons per ac. increased yields significantly. Cotton grown in ridges 4 ft. apart gave higher yields at 18 or 24 in. spacings than at 30 or 36 in. spacings.

2. Land use, St. Vincent, pp. 5-7. Of several close-season treatments, significantly lowest yields were obtained from cotton after a weed fallow. Addition of fertilizers tended to depress yields. Antigua, pp. 8 - 10. In rotation trials, cotton yields increased by 11% after 3 years of sugar-cane but fell by 40% after 3 years of elephant grass, cut and carried off, compared with the yields obtained after a weed fallow. In these trials the close-season green-manure failed in the very dry conditions. There was a reduction in *Cynodon dactylon* and other weeds in cotton following a cane series.

3. Sea Island cotton variety trials, Antigua, Montserrat and Nevis. pp. 12-13. VH8 varieties yielded best in Antigua and MSI varieties in Montserrat.

4. Trials of introduced cottons, Antigua, pp. 14-15. American Upland Cottons compared well with MSI, but none of the *barbadense* varieties, in a more extensive trial, yielded as high as BAR X L1 or MSI.

5. Insecticide trials, Antigua, pp. 17-18. Applications of 4 lb. 50% DDT or 2 lb. DDT emulsion with 48 c.c. Fosferno per ac., and 0·5 lb. Endrin per ac. resulted in significantly increased seed-cotton yields, mainly through the control of the sucking bug, *Nezara viridula*. The results indicated that Fosferno was necessary to prevent aphis build-up.—M.P.

1002 INSTITUT DE RECHERCHES DU COTON ET DES TEXTILES EXOTIQUES. Activité de l'IRCT. Année 1953. [**The work of the IRCT during 1953.**] *Cot. et Fibr. trop.* 1954, **9,** No. 2, 139-279, illus.

INVESTIGATIONS REPORTED :

1. French Equatorial Africa. Bambari Station, pp. 150-70. In trials in the Ubangi, the variety Banda 2 yielded, on an average, 27% more seed-cotton, or 34% more lint, than Triumph. In 2 trials in the northern part of the cotton area, the variety Samaru 26 C of the Allen type was better than Triumph. A trial was carried out with the variety Samaru 26 C at Bossangoa to study the effect of date of topping on *Lygus* development and cotton yields. Topping, on 10 Sept., the upper 10 cm. of plants sown at the beginning of July lowered yields by 64 kg. per ha., compared with the control which yielded 256 kg. per ha.; topping on 17 Sept. lowered yields by 25 kg., but with topping on 24 Sept. and 1 Oct. yields were higher than the control, by 8 and 23 kg. per ha., respectively. *Lygus* populations were lower than in the controls for a month after topping ; topping on 17 Sept. seemed to give the greatest reduction in populations. Tikem Station, pp. 175-84. In varietal trials Allen 50 T yielded best. In cultural trials the best sowing date was 15 June ; yields of seed-cotton were 25% lower when sowing took place at the beginning or at the end of June. In soils of medium fertility, spacing at 80 × 40 cm. was better than spacing at 100 × 50 cm. Bebedjia Station, pp. 185-91. In varietal trials, Allen 150 gave the highest yield of seed-cotton and lint. A trial to study the position of cotton in the rotation showed that cotton yielded best when grown at the beginning of the rotation after a fallow. In a trial of cotton irrigation, 6 irrigations, of 80 mm. of water each, given in the period 1 Oct.-31 Dec. resulted in the highest increase in cotton yield, 152·7%, over the non-irrigated control.

2. French West Africa. Togo, Bouaké Station, pp. 201-15. The highest yields ever recorded at Bouaké, often exceeding 1 metric ton of seed-cotton per ha., from Upland and *Gossypium barbadense* types, were obtained in 1953 following insecticidal treatment. Mono 53, a Togo variety, yielded 135 % and 194% more seed-cotton than the local variety Bouaké, with and without insecticidal treatment, respectively. M'Pesoba-Koutiala Station, pp. 215-18. Varietal trials at the Station and in the Sudan-High Volta region confirmed the superiority of A-49-T over other varieties grown. Allen-150, tested for the first year in the Sudan, yielded more than A-49-T, but proved to be susceptible to jassids [*Empoasca* sp.]. In a spacing and thinning trial, the highest yield was obtained at the spacing of 80 × 40 cm. and by thinning to 1 plant per hole, corresponding to a density of 31,250 plants per ha.

3. Madagascar. Cotton, p. 236. With a view to introducing cotton cultivation, trials are carried out to determine the best regions for cotton and to find suitable varieties. The varieties Acala and Ashmouni are satisfactory.

4. North Africa. Morocco, Tadla Station, pp. 237-64. The variety Pima 67 M 151 yields 20% more, is earlier and more uniform than Pima 67 common type. Its ginning return is 30% as against 28% from the common type. Two years' irrigation trials indicated that the optimum total amount of irrigation water is 10,000 cu. m. per ha. and that during a warm period each irrigation should supply 600 cu. m. per ha. every 10 days from flowering to boll opening. Endrin spray and 60% Cryolite dust gave good control of *Earias* sp., the most serious pest. Four treatments with these preparations should be given from the beginning of flowering to the start of " chergui ", a hot wind which controls the cotton pests. In varietal trials Ashmouni yielded best with 795 kg. per ha., followed by Pima 67 M 151 (742 kg.), Pima 67 M 152 (708 kg.), Pima 32

(701 kg.), Menoufi, Karnak and Pima 67 common type. Karnak was the earliest (60% of cotton harvested on 15 Sept.), followed by Menoufi, Ashmouni and the Pima varieties. A sowing-date trial indicated that the best period is 15-30 March. Algeria. Textile Section of Perregaux, pp. 265-74. In trials with several varieties tested in different regions, Ashmouni yielded, on an average, significantly more, with 2356 kg. of seed-cotton per ha., than the other varieties tested, i.e., Giza 30, Menoufi, Karnak, Orléansville 2 and Giza 45. In the Cheliff plain yields were significantly higher than in the other regions. As a result from trials in which densities of 25,000 to 200,000 plants per ha. were compared, densities of 70,000-100,000 plants are recommended. There was no difference in these trials from thinning to 1 or 2 plants per hole. Studies are made to improve cotton cultivation in the salty soils of the low Cheliff (2·5-3% NaCl) where the presence of salt lowers cotton yields. Textile Section of Bona, pp. 275-9. Climate was exceptionally favourable for cotton cultivation. Acala 4-42 and Acala California are considered superior to Acala III in ginning return, resistance to jassids [*Empoasca* sp.] etc., but differences between these varieties were not significant in the 1953 trials. In a trial of sowing density, the following treatments were compared : (a) no thinning ; (b) thinning to 1 plant every 15 cm. in row ; (c) thinning to 1 plant every 25 cm. in row. The distance between rows was 1 m. in each case. The yields were 2410, 2780, 2680, the percentage of good fibre 70, 77 and 75 and the plants bearing no bolls 48·7, 0 and 0 for the 3 treatments, respectively.—E.B.O.

FLAX

1003 Statens Forsøgsvirksomhed i Plantekultur. Forsøg med sorter af spindhør 1949-1952. [**Trials with varieties of flax 1949-1952.**] *Medd. 500. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **57,** No. 2, 365-6.

The trials reported were carried out at 4 locations in Denmark. Eight varieties were included in trials during 1949-52, two additional varieties were included during 1950-2 and one additional variety in 1951-2. Highest average yields of long fibre out of 8 varieties during 1949-52 were given by Hareskovgaard 75, with 695 kg. per ha., followed by Percello, Liral Sussex, Svaløf Margareta and Hollandia, with 670, 661, 652 and 640 kg. per ha., respectively. Long-fibre yields of Cascade and Øtofte 356, included in 1950-2, averaged 684 and 704 kg. per ha., respectively. The yield of Svaløf Kristina, included in 1951/2, averaged 695 kg. per ha. Hareskovgaard 75 had the greatest tendency to lodge (4·4 units on a scale 0-10, where 10 = completely lodged). Cascade and Øtofte 356 also had a considerable tendency to lodge. Brief notes are given on each variety.—P.J.B.

1004 Frederiksen, P. S. **Weed control with DNC (sodium) and MCPA (sodium) in fibre flax in Denmark.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 7. [Dansk Hørforskningsinstitut]

The results of trials during 1939-48 on the use of cultural methods for controlling weeds in flax, showed that it was possible to control weeds by harrowing along the rows when the plants were 2-4 cm. high and the soil was not too loose. Inter-row cultivation was effective where rows were 15-18 cm. apart and the flax was not more than 6 cm. high. In trials during 1948-54, the following materials were applied in a spray volume of 1000 l. per ha. when the plants were 3·5-6 cm. high : 30 kg. copper sulphate, 30 kg. copper chloride, 2·5 kg. Na DNC, 1·25 kg. ammonium DNC, 0·75 kg. ammonium DNOSBP, 0·5 kg. Na MCPA and 1·25 kg. DNC + 0·5 kg. Na MCPA. DNC, MCPA and DNOSBP were all much superior to the copper compounds in terms of weed control and lack of injury to the flax. The copper compounds resulted in yield increases of 50 kg. seed per ha. DNC, DNOSBP and MCPA treatments resulted in seed-yield increases of 127-188 kg. and long-fibre-yield increases of 69-105 kg. per ha., while the DNC + MCPA mixture resulted in yield increases of 259 kg. seed and 129 kg. long fibre per ha. Na DNC and Na MCPA, alone, or in mixtures, were considered the most effective materials. Na DNC did not exercise its full effect before 12 hr., compared with 3 hr. for ammonium DNC ; also the effect of Na DNC was less influenced by day temperatures. Trials during 1951-4 were carried out using Na DNC, Na MCPA and mixtures of both. Again, mixtures of DNC + MCPA had a more comprehensive effect against weeds than either material used singly and had no more injurious effect on the flax. Applications of 0·5 kg. DNC + 0·4 kg. MCPA, or 1 kg. DNC + 0·2 kg. MCPA per ha. in 300 gal. spray volume resulted in seed-yield increases of 317-319 kg. per ha. and long-fibre-yield increases of 138-153 kg. per ha. Control of *Sinapis arvensis*, *Chenopodium album* and *Polygonum convolvulus* was good. Results were equally good where 300 l. spray-volume with a pressure of 20 atm. was used, as where 1000 l. spray-volume with a pressure of 3 atm. was used. Using the former spray-volume, a reduction in the amount of DNC applied could be made.—P.J.B.

1005 Fröier, K. and Zienkiewicz, H. **Survey of Swedish experiences of chemical weedkillers used in fibre flax during the years 1940-1953.**

Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954 pp. 13, bibl. 17. [Swedish Seed Ass., Svalöf]

The results are given of trials using sulphuric acid, copper compounds, DNC, MCPA and mixtures of DNC and MCPA. MCPA + DNC mixtures have given the best results. A preparation of 12 l. liquid containing 384 g. MCPA + 1562 g. DNC, applied in 500 l. spray-volume per ha., at a pressure of 7-8 atm., has given very good results where weed incidence was high. Where tractor-driven, high-pressure sprayers were available and weed incidence was relatively less, the volume of liquid preparation used could, it was considered, be reduced to 8-9 l. per ha. In trials in 1950-3, studies were made on the effect on flax of spraying with DNC, MCPA, or DNC + MCPA preparations at different growth-stages and at different spray-volumes and pressures. Where MCPA, or DNC + MCPA preparations were used, the optimum growth-stage was when the plants were 4-6 cm. high ; where DNC, alone, was used, spraying when the plants were 5-15 cm. high had no appreciable effect on fibre quality, given appropriate rates of treatment. Spray-volumes between 350 and 450 l. per ha. appeared to be best, with pressures of 7-8 atm. Considerable emphasis is laid on the effect of herbicides on the fibre quality of flax.—P.J.B.

1006 FREDERIKSEN, P. S. Fosfor- og kaliumgødning til spindhør. [**Phosphate and potash manuring for flax.**] *Beret. 19. Dansk Hørforskningsinst.* [Contained in] *Tidsskr. Planteavl* 1954, **58,** No. 2, 278-97, bibl. 25, English summary p. 296.

A summary is given of results in the literature on the uptake of P and K by flax, which showed a mean uptake of 14·7 kg. P and 62·9 kg. K per ha., for a mean straw yield of 6422 kg. per ha. The results are given of 53 trials during 1947-53 at different locations in Denmark on the effect of P and K on flax yields. Trials in which 400 and 800 kg. 18% superphosphate per ha. were used for green-scutched flax, indicated that such treatments increased the yields of seed and tow, but decreased long-fibre yields. In a second trial, spring or autumn applications of 700 kg. superphosphate, 400 kg. 40% K salts, or 700 kg. superphosphate + 400 kg. K salts per ha. were made. P treatments, applied in either spring or autumn, had no significant effect on long-fibre yields, though mean yields were increased slightly. K treatments in autumn significantly increased long-fibre yields ; similar spring treatments reduced long-fibre yields, a probable results of Cl-toxicity. Large applications of P appeared to reduce the strength of long fibre. The 400 kg. per ha. K salt treatments increased the breaking strength of the fibre.—P.J.B.

HEMP

1007 RAGAZZI, G. La semente di canapa. [**Hemp seed.**] *Ital. agric.* 1955, **92,** No. 3, 216-22, bibl. 2, illus.

Information is given on growing and harvesting hemp [*Cannabis sativa*] for seed in Italy. The seed is sown at the rate of 12-15 kg. per ha. in rows spaced at 50-60 cm. Thinning is achieved by cutting down the male plants ; this operation takes place at the beginning of August in Emilia. The seed is harvested during 10-15 September. The seed yield is as high as 500/600 kg., or more, per ha. A machine is described which separates the seed according to size. The weight in g. of 1000 seeds of each of the 4 sizes obtained was found to be 22·7, 18·7, 17·5 and 14·0, and the germinating capacity (percent) 90, 75, 75 and 60, respectively. Only seed of the first category, and possibly of the second, should be used for sowing.—E.B.O.

KENAF

1008 JUAREZ, L. Experimentación con " kenaf" en la Molina. [**Experiments with kenaf in la Molina.**] *Bol. trim. Exp. agropec., Lima* 1953, **3,** No. 3, 14-19. [Esta. Exp. Agric., La Molina, Peru]

Two experiments were carried out in 1952 with kenaf (*Hibiscus cannabinus*), the first to compare the yields of 2 varieties and the second to compare the effect on yields of manurial treatments. In the first experiment, Cáñamo Blanco and Cáñamo Rojo (sown on 29 Jan. at 30 kg. per ha.) yielded 1940 and 1577 kg. of fibre per ha., respectively. Both varieties suffered from attacks by *Heterodera* sp. and they appeared equally susceptible. The quality of fibre obtained did not differ between varieties. In the trial of manurial treatments, the highest yields of fibre (1959 kg. per ha.) were obtained by applying potassium nitrate (at a rate of 120 kg. N per ha.) which gave greater yields than sodium nitrate at 180 kg. N per ha. (1845 kg. fibre per ha.), the unmanured control (1542 kg. fibre per ha.) or guano at 120 kg. N per ha. (1171 kg. fibre per ha.) —W.J.B.

URENA LOBATA

1009 INSTITUT DE RECHERCHES DU COTON ET DES TEXTILES EXOTIQUES. Activité de l'IRCT. Année 1953. [**The work of the IRCT during 1953.**] *Cot. et Fibr. trop.* 1954, **9,** No. 2, 139-279, illus.

INVESTIGATIONS REPORTED :

French Equatorial Africa. Madingou Station, pp. 192-200. In a trial to determine the best harvest date for *Urena lobata* var. Nigeria, the

plants were cut at 6 dates from 28 Feb., when 1 flower showed, to 7 Apr., when about 25 flowers were present. Yields increased with later harvest dates. In a trial to compare 5 different sowing dates, from 8 Oct. to 3 Dec., with *U. lobata* var. Nigeria, the highest yield was obtained with the earliest date. In a trial to compare 5 different sowing dates, from 19 Oct. to 2 Feb., with kenaf (*Hibiscus cannabinus*) the highest yield was obtained with the earliest date.—E.B.O.

OIL CROPS

LINSEED

1010 FRIEDERICH, J. C. Verslag van de werkzaamheden van de werkgroepen van de Commissie Oliehoudende Zaden over het Jaar 1952. Verslag over het onderzoek en de teelt van olievlas. [**Report of the working group of the Commission for Oil-Bearing Seeds. 1952. Linseed trials.**] *Meded. 19. Ned. Vlasinst., Wageningen* 1952, 11-15, English summary pp. 12-13. [Received 1955]

Eight variety trials were carried out in 1952 with 4-15 varieties of linseed, using the variety Daehnfeldt as a control. The varieties Minerva and Viking had the highest oil content in the seed, 41·9 and 41·7%, respectively. Daehnfeldt had an oil content of 41%. Inter-varietal differences in seed yield were not marked. The resistance of the variety Valuta to lodging and to attack by *Alternaria* sp. was low, compared with the other varieties. The seed yield in 1952 of all varieties was low (less than 200 kg. per ha.), owing to a drought in June (during flowering) and heavy rains in July. A survey of yields over 5 years of trials showed a negative correlation between the yield of seed and the amount of rainfall in July.—W.J.B.

1011 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. Forsøg med sorter af oliehør 1949-1952. [**Trials with varieties of linseed 1949-1952.**] *Medd. 501. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **57,** 366-8.

The trials reported were carried out at 4 locations in Denmark. Five varieties were included in 15 trials and three varieties in 7 trials, only. Of the 5 varieties included in 15 trials, seed yields (90% moisture-content basis) of Trifolium Rekord, Dæhnfeldt Elite 6, Aarslev 2984, Klein Nr. 18 and Svaløf Valuta averaged 18·1, 17·8, 17·4, 17 and 16·4 hkg. per ha., and oil yields averaged 685, 689 668, 646 and 637 kg. per ha., respectively. Seed yields of Øtofte L.12, Langelands B.L. and Svaløf 01052 (7 trials) averaged 17·9, 16·8 and 16·6 hkg. per ha. and oil yields, 684, 627 and 641 kg. per ha. Tendency to lodge was greatest in Langelands B.L., Svaløf Valuta and Svaløf 01052 and least in Trifolium Rekord. A brief description is given of each variety.—P.J.B.

1012 BAGGE, H. Forsøg med oliehørsorter 1949-1952. [**Trials with linseed varieties 1949-1952.**] *Beret. 482. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, No. 4, 678-90.

This paper gives a more detailed account of the trials reported in the previous abstract.—P.J.B.

1013 GRAY, S. G. **Trials with introduced linseed varieties in southern Queensland [1945-51].** *Tech. Pap. 3. Div. Pl. Industr. CSIRO* 1954, pp. 19, bibl. 5.

1014 ANDRÉN, F. Försök med betning av linfrö. [**Trials on the treatment of linseed.**] *Växtskyddsnotiser* 1954, No. 2-3, 22.

The results are given of seed-treatment trials, using 7 fungicides containing Hg and 4 without Hg for treating linseed infected by *Alternaria* sp. and *Colletotrichum* sp. Best results, in terms of plant stands, followed the use of Panogen 4930 and the Hg-free materials Aatiram, Arasan and Special Panogen. It is concluded that Hg-free fungicides are to be preferred to those containing Hg for treating linseed.—P.J.B.

1015 SPRENGER, J. J. I. Verslag van bewaarproeven met zaaizaad in twee pakhuizen, uitgevoerd tijdens het winterseizoen 1952-3. [**Report on storage tests with seed in two grain stores during the winter 1952-3.**] *Publ. Droogtechnisch Lab. 45. Cent. Inst. Landbouwk. Onderz., Wageningen* [n.d.], pp. 7, illus. [Received Dec., 1954]

Observations were made at two grain stores in the Netherlands on temperature and relative humidity (inside and outside the stores), and on the moisture content and germinative capacity of the grain. One store contained linseed, the other oats ; both lots of grain were intended for use as seed. The results are tabulated in detail. A graph is shown in which the equilibrium moisture-contents of linseed grain are plotted against the various relative humidities with which they correspond. In the case of linseed, the equilibrium moisture-content (12·5%) which corresponded with an R.H. of 74% at a temperature of 6°C. was found to be higher than the equilibrium moisture content (10%) which, as a result of previous experiments carried out at 15°C., was believed to correspond with an R.H. of 74%. No such divergence from previously determined equilibrium moisture-contents was observed in the case of oats.—W.J.B.

RAPE

1016 Statens Forsøgsvirksomhed i Plantekultur. Foreløbig meddelelse om såtidsforsøg med vinterraps. [**Provisional report on sowing-date trials with winter rape.**] *Medd. 511. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1954, **58,** No. 2, 366-8.

The results are given of 13 trials in Denmark during 1951-3, at 5 locations. Sowing dates (average) were : 4 May (in barley), 17 August, 1 and 15 September. Mean seed yields (10% moisture) for these sowing dates were 19·5, 19·7, 17·6 and 9·3 hkg. per ha. and mean crude-oil yields were 7·9, 8·1, 7·2 and 3·7 hkg. per ha., respectively. Average dates of maturation ranged from 21 July for the spring-sown crops, to 4 August for the crops sown on 15 September. It was concluded that for Danish conditions, sowing in mid-August was best ; sowing under a cover crop resulted in more variable yields, owing to the effect of the cover crops.—P.J.B.

1017 Hörberg, Y. Weibulls Margo höstraps. [**Weibull's Margo winter rape.**] *Weibull's Årsb.* 1954, Autumn, 8-9.

Weibull's Margo winter rape [*Brassica napus* var. *oleifera* subvar. *biennis*] was placed on the market in 1953. In trials during 1951-3 at Weibullsholm, Margo gave an average seed yield of 4170 kg. per ha., and about 2100 kg. per ha. in official trials in a number of provinces in 1952-3. In the Weibullsholm trials, Margo outyielded Lembke, Matador B and Regal by 6·5, 4·9, and 4·6%, respectively. The oil content of Margo and Matador B in 1951-3 averaged 46·4 and 46·3%, respectively.—P.J.B.

1018 Murbach, R. Abeilles et colza. [**Bees and rape.**] *Rev. rom. Agric.* 1955, **11,** No. 4, 25-6, bibl. 3. [Domaine de Changins-sur-Nyon, Switzerland]

Examples are given of statistically significant increases in yields of rape seed as a result of placing beehives near the crop.—D.B.

MUSTARD

1019 Andersson, G. and Olsson, G. Försök med sareptasenap och svartsenap som oljeväxter. **Experiments with leaf mustard and black mustard as oil seed crops.** *Sverig. Utsädesfören. Tidskr.* 1953, **63,** No. 5, 397-415, bibl. **17,** illus., English summary pp. 412-13.

A description is given of the botanical characters of leaf mustard (*Brassica juncea*) and of black mustard (*B. nigra*). The results are given of trials to compare the yield of seed, crude-fat and crude-protein content in the seed, iodine number, number of days from sowing to maturity and the stalk stiffness of leaf mustard from different origins and of Svalöf's Regina spring rape. These trials were conducted by the Swedish Seed Association at Svalöf and at sub-stations in south and central Sweden, during 1945-51. In all cases, the crude-fat and crude-protein yields of leaf mustard from Stalingrad outyielded both Regina spring rape and leaf mustard from other origins, except a strain introduced from Giessen, which was tested to a limited extent only. The highest oil content in the seed and the most stiff-stalked variety was Fiskeby, a late-maturing, yellow-seeded type. Black mustard has been tested to a limited extent, but has proved of little value for practical agriculture in Sweden owing to its low oil content, high content of allylisocyanate and its tendency to seed-shedding. In trials during 3 years, the content of allylisocyanate in the seed of Regina spring rape, Stalingrad leaf mustard and black mustard averaged 0·12, 0·44 and 0·53%, respectively. The tendency for leaf mustard to seed-shedding equalled, or slightly exceeded, that of spring rape. Leaf mustard and black mustard appear to be less liable to attack by pod gall midge (*Dasyneura brassicae*), but more susceptible to club root (*Plasmodiophora brassicae*) than Regina spring rape.—P.J.B.

OTHER

1020 Krzymański, J. Badenie chemiczne nasion, oleju i makuchu z kapusty abisyńskiej (*Crambe abyssinica* Hochst.) [**Chemical testing of Abyssinian cabbage (*Crambe abyssinica*). Seeds, oil and seed cake.**] *Rocz. Nauk Roln. Ser. A* 1954, **69,** No. 3, 341-8, bibl. 9, English summary, p. 348.

Abyssinian cabbage is a spring plant, unexacting in its soil requirements. On light soils it gives higher yields than spring rape. Yields reach 8-22 quintals per ha., which corresponds to 3-8 quintals of oil per ha. Seed cake obtained from husked seeds of Abyssinian cabbage should be a valuable feed concentrate because of its high protein content, approx. 50%.—From author's summary.

LAND USE, SURVEYS AND MANAGEMENT

1021† NUTT, J. D. **Farming in south-eastern Scotland in retrospect. An economic survey of war-time and post-war changes.** *Trans. roy. Highl. agric. Soc. Scot.* 1953, **65,** 1-41, bibl. 3 in text. [Received December, 1954]

The area served by the Edinburgh and East of Scotland College of Agriculture is considered. The changes in crop and grass acreage, stock numbers, labour and power are tabulated for 1939, 1945, 1948 and 1952 and are discussed at length. The size and tenure of holdings and their expenditure and output are dealt with, for these years, in relation to the 5 principal types of farming practised.—M.P.

1022 ORAM, P. A. and JONES, D. K. **The agricultural revolution in Turkey—1.** *World Crops* 1955, **7,** No. 4, 137-42, bibl. 5, illus.

The improvements in agricultural production in recent years in Turkey are described. The use of mechanized equipment on a large scale has led to the extension of the area under cereals (particularly wheat and barley), sometimes at the expense of the grazing area. The average yield per ac. and the total yield of cereals have both risen steadily since 1950. Controlled cereal-seed production is largely carried out on state farms, often more than 50,000 ac. in extent. These farms produce more than 10% of Turkey's seed requirements. Cereals are commonly grown in a simple cereal/fallow rotation. The sugar-beet industry is highly developed. The sugar-factories are responsible for the importation, multiplication and distribution of sugar-beet seed ; contracting farmers are being compelled to use rotations including legumes.—W.J.B.

1023† MIDDLETON, J. F. M. and GREENLAND, D. T. **Land and population in West Nile district, Uganda.** *Geogr. J.* 1954, **120,** No. 4, 446-57, illus.

A brief study was made of land use, effects of overpopulation, labour migration to southern Uganda and the introduction of new crops in the north-west corner of Uganda. The low-lying land in this area has a low rainfall and is mostly covered by thick, game- and tsetse-infested bush and is unpopulated. The high-land is an almost treeless plateau with a good rainfall. The fertility is such that the land can support up to 250 persons per sq. mile, but high-value cash crops cannot be grown successfully in all areas. Land lying fallow, or land where the soil is thin, is used for grazing. On the highly fertile riverine lands, sweet-potatoes, maize, sugar and bananas are grown with very short fallows. Lands around homesteads, fertilized with ashes and manure, are used for more demanding cash crops, also for eleusine grown in mixed stands with sorghum, pigeon pea and simsim [*Sesamum indicum*]. The rotations vary with the settlements. Labour migration, which is high in areas of dense population, is considered to be a symptom of the shortage of good land for cash crops such as tobacco and cotton.—M.P.

1024† HARGOT, F. Monographie agricole du Maniema. [**Agricultural monograph of the Maniema district (Belgian Congo).**] *Bull. agric. Congo belge* 1955, **46,** No. 1, 1-56, bibl. 15, illus.

1025 MILANO, V. A. and MARZOCCA, A. Las plantas cultivadas en la Tierra del Fuego. [**Cultivated plants in Tierra del Fuego.**] *Idia* 1954, No. 80, 3-40, bibl. 53, illus.

The physical and plant geography, soil and climate of the State of Tierra del Fuego, Argentina, are outlined. The cultivated plants of the region are described systematically, with notes on their place in agriculture and the chief varieties used. Among those described are Gramineae (including oats, wheat, barley and rye), Chenopodaceae, Cruciferae, and Solanaceae.—W.J.B.

1026† SMITH, R. F. **The reclamation of derelict woodland.** *Agriculture, Lond.* 1955, **61,** No. 10, 482-4. [Agric. Land Serv., Eastern Province]

The reclamation, for agricultural purposes, of 30 ac. of derelict woodland in Hertfordshire is described. The stand of hardwoods (oak and ash) was felled during the Second World War and there has since been a considerable growth of coppice and scrub. The soil is boulder clay on chalk. The top growth was cut by hand and burned during the winter 1953-4. The use of mechanical cutters and grabs and buck-rakes for cutting and removing coppice and scrub, and the use of bulldozers for removing scrub, saplings and medium-sized roots, are discussed. The stumps and roots were removed by heavy-duty bulldozers, winches and, in some cases, by explosives. Rooters were used to remove small roots. Discing with heavy ploughing discs and then with disc-harrows followed rooting. The reclaimed land was sown with mustard and rape in June, 1954 in preparation for winter wheat. It is estimated that the capital outlay incurred will be recouped in 6 years by the returns from crop yields.—W.J.B.

1027† MAGRON, R. La mise en valeur des déserts de l'ouest des États-Unis. [**The reclamation of the western deserts of the USA.**] *Agron.*

trop. 1955, **10,** No. 1, 79-89, illus., English and Spanish summaries p. 89.

A French mission visited the USA during 1953 to study the reclamation of under-developed regions. This preliminary article is concerned, mainly from the economic aspect, with the reclamation of the western deserts of the USA by means of irrigation. The 2 cases examined are the irrigation by gravity in the Imperial Valley, California, and the irrigation by pumps in Arizona. —E.B.O.

1028 STRAATMANS, W. **Reclamation of tidal mud flats in Tonga.** *Tech. Paper 53. South Pacific Comm.* 1954, pp. 18, bibl. 10, illus. [Dep. Agric. Nuku'alofa, Tonga]

The reclamation of tidal flats in Tonga is described and an account is given of the various soil-profiles found in the reclaimed area and the vegetation changes which have taken place, in the two years following reclamation, on the various types of reclaimed land, including sandflats and former tidal forests. In preliminary trials, cassava, sweet-potatoes, maize and rice were grown in clearings in former tidal forest, dominated by *Exoecaria agallocha*, and in cleared areas of former mangrove swamps. Cassava, sweet potatoes, maize and rice were successfully grown on suitable soils in the former *Exoecaria agallocha* areas. Useful crops have not so far been successfully grown on the former mangrove areas. On the sandflats, no attempt is made to grow arable crops : in these areas, the establishment of a grass cover of *Cynodon dactylon* and *Paspalum vaginatum* is the first concern.—W.J.B.

1029 BEARE, J. A. **Sulphate of ammonia on drifting sandhills. A provisional report of experiments being conducted at Wanbi Research Centre.** *J. Dep. Agric. S. Aust.* 1955, **58,** No. 6, 244-5, illus.

Preliminary trials were carried out in 1953 and '54 on the growth of rye on drifting sandhills. The application of 28 lb. sulphate of ammonia and 1 cwt. superphosphate per ac. increased early growth and the land was quickly and successfully stabilized.—M.P.

FARMING SYSTEMS AND PRACTICES

1030† MAURON, P. and GERBER, A. Étude du " Farm-Planning " aux U.S.A. [**A study of " Farm-Planning " in the USA.**] *Bull. tech. Inform.* 1955, **96,** 55-70, illus.

This is a report by a French agricultural mission which, in 1952, spent 2 months studying the problems of organization and simplification of farming systems in the USA. Particular emphasis is laid on farm planning which is still in its early developmental stages in the USA. The authors discuss the possibilities of introducing a similar system into French agriculture and conclude that the essential information and experiments on agricultural amelioration are available in France but in an uncoordinated form and are of value to the larger rather than to the average or smaller farms. The need for a more detailed survey of all agricultural holdings is stressed. This would provide the relevant information on agricultural progress in a clearer and more concisely documented form than is at present available to the farmer.—M.P.

1031 ROBERTSON, J. K. and ROMBULOW-PEARSE, C. W. **A system of cultivation in the Mbeya district of Tanganyika.** *E. Afr. agric. J.* 1955, **20,** No. 3, 166-7, illus. [Dep. Agric., Tanganyika]

The system of cultivation described is of very recent origin, and is similar to the mound cultivation practised in the Ufipa district of Tanganyika [see *Fld Crop Abstr.* 4 : 482]. It differs in that the cut grass (*Hyparrhenia* sp.) and the upturned turves of a bush or grass-fallow are piled in long continuous banks 5 ft. apart and covered with loose soil till the bank is 1-1·5 ft. high. The main crops grown in the rotation are : finger millet (*Eleusine coracana*), maize, bush bean (*Phaseolus* sp.) field peas, sweet-potatoes and cassava. The rotation may last 8-11 years, depending on the crop yields obtained, before the land is allowed to revert to *Hyparrhenia*-dominated fallow. In this system of bank cultivation the burning of grass or turf is unnecessary.—M.P.

1032 JEWITT, T. N. and MIDDLETON, K. R. **Changes in Sudan Gezira soil under irrigation.** *J. agric. Sci.* 1955, **45,** Pt. 3, 277-9, bibl. 8. [Res. Div., Minist. Agric., Sudan]

The effect of different amounts of irrigation water on the salts in Gezira soil has been studied by comparison of different rotations in 2 long-term experiments at the Gezira Research Farm. The conclusion is drawn that none of the rotations studied shows any evidence of salts rising or accumulating in the profile. There is some evidence of a removal of salts from a 6 ft. profile.—Authors' summary.

1033 CORDES, T. K. **Spray irrigation.** *World Crops* 1955, **7,** No. 3, 115-17, bibl. 2, illus.

Technical and economic aspects of the use of various types of overhead-irrigation equipment are discussed.—W.J.B.

1034† UHLIG, S. Die Auswirkungen von Windschutzhindernissen auf das Klima der bodennahen Luftschicht. [**The effect of windbreaks on the climate of the layer of air near the ground.**] *Landw. Jahrb. Bayern* 1955, **32,** No. 1/2, 90-110, bibl. 13, illus.

The effects of the density of the windbreak on velocity of the wind, distribution of rainfall and snow pile, evaporation rate, and dew formation are discussed and illustrated with graphs and diagrams. An example is given of increased yields of barley within the shelter of a windbreak. Various types of windbreak, including tall-growing crops, are discussed.—D.B.

1035 CAESAR, K. Vergleichende Untersuchungen an Winterzwischenfrüchten. [**Comparative trials with winter catch crops.**] *Z. Acker- u. Pflbau* 1954, **98,** No. 4, 471-504, bibl. 82. [Inst. Pflanzenbau und Pflanzenzüchtung, Höhenheim, W. Germany]

The winter catch crops, rye [*Secale cereale*], fodder rape [*Brassica napus*] and fodder turnip rape [*B. campestris*], were compared as regards their response to cultivation measures (rate and time of seeding, date of cutting, manuring), the effect of these measures on fodder value (e.g. crude protein and fibre content) and the costs of production relative to good meadow hay. Finally, these results are discussed as they affect farm management.—D.B.

1036† GLIEMEROTH, G. Möglichkeiten der Beeinflussung von Wurzelmasse und Wurzeldifferenzierung. [**The possibilities of the influence of weight and differentiation of roots.**] *Landw. Forsch.* 1955, Sonderheft 6, 69-85, illus.

Data are presented showing the effect of the root mass of the preceding crop on the root system of the succeeding crop with special reference to the favourable effect of a leguminous catch crop on the main crop. This favourable influence, which is expressed as a greater depth of roots and an increase in development of lateral roots and root hairs, is attributed to the increased quantities of nitrogen in the lower layers of soil and to the greater capacity of the soil to absorb water from the sub-soil.—D.B.

1037† KELLER, E. R. Über den Einfluss verschiedener Deckfrüchte auf Entwicklung und Ertrag von Futterpflanzen mit besonderer Berücksichtigung einiger mikroklimatischer Faktoren. [**The effect of various nurse crops on the development and yield of fodder crops with particular reference to microclimatic factors.**] *Promotionsarb. 2356 Eidg. Techn. Hochsch., Zürich* 1954, pp. 133, bibl. 90, illus. [Received March, 1955]

The nurse crops were spring- and winter-wheat and barley and green oats. The fodder crops, which were sown with and without a nurse crop, were *Lolium italicum, Arrhenatherum elatius* and a mixture of the latter with *Medicago sativa*. The effect of several factors on the development and yield of the fodder crops was studied with the following results. (1) The under-sown crop seldom suffered from lack of soil water as a result of the demands of the nurse crop. (2) Light intensity proved to be the most important factor for development of the fodder crops. Spring cereal shaded the seedlings least and for a short period. (3) The air temperature in proximity to the under-sown crop was higher than in the open but the difference was not such as to influence growth of the fodder crop one way or the other. Some respects in which the fodder crop reacted to the presence or absence of a nurse crop were studied. In most instances the mortality of seedlings was the same whether the fodder crop was grown with or without a nurse crop, but the mortality of lucerne in spring- and winter-wheat was strikingly high. The nurse crop had but little influence on the proportions of the constituents of the fodder mixture; rainfall was a more important factor. Scorching of the under-sown crop on exposure to the sun's rays after cutting the cereal crop occurred chiefly in those seedlings which were not sufficiently advanced, and could be avoided by sowing early. The critical temperature at which scorching occurs is lower on dark than on light coloured soils. As regards yields, the following general recommendations are made. For a [total] high yield of nutrients, lucerne/grass mixture should be sown in a rigid, short-strawed nurse crop preferably spring-barley, green oats or early ripening winter-barley, but if a large quantity of green fodder is required in the autumn of the first year of growth, the fodder crop should be grown without a nurse crop.—D.B.

SOIL AND WATER CONSERVATION

1038 BENNETT, W. H. and others. **Fifty years of dry land research at the Nephi Field Station.** *Bull. 371. Utah agric. Exp. Sta.* 1954, pp. 81, bibl. 22.

A summary is given of the results of dry-land research carried out at the Nephi Field Station, Utah, since 1903. Rainfall at the Station averaged 12·7 in., with May the wettest, and June the dryest, months. Winter wheat appears to be the crop best suited among those tested, with the varieties Utah Kanred, Turkey 926 and Cache (smut-resistant) giving the best results. Baart, the best spring-wheat variety, gave about half the yields of winter wheat. In long-term tillage experiments, yields of winter wheat where the land was ploughed to a depth of 8 in. were 8% higher than where a depth of 5 in. was used. Highest winter- wheat yields followed ploughing in very early spring ; delaying ploughing in early spring markedly reduced yields. In most cases, green manure crops (field peas or wheat) reduced winter- wheat yields, though peas, ploughed under when not above 12 in. high, resulted in slight yield increases. In trials during 1915-53, the effect on wheat yields of burning straw versus ploughing all the straw under was compared. Burning the straw increased yields for many years and then slowly decreased yields ; over the trial period, burning the straw increased yields by an average of 2%, compared with ploughing the straw under. Over 10-year intervals, the yield superiority in the first decade where the straw was burnt was 4% ; in the last decade, a yield inferiority of 0·5% occurred. Removing most of the straw from the trial plots reduced average yields by 1·3%, compared with where the straw was ploughed under. The standard wheat/fallow rotation gave greater net returns than the other rotation systems used. Wheat yields increased consistently as sowing rates increased from 2 to 6 pecks per ac. and thereafter remained relatively constant. During the wheat/fallow rotations, only 32% of the rainfall was stored as soil moisture. Summer rainfall was ineffective for building up soil moisture reserves.—P.J.B.

1039† BUTLER, P. F. and PRESCOTT, J. A. **Evapotranspiration from wheat and pasture in relation to available moisture.** *Aust. J. agric. Res.* 1955, **6,** No. 1, 52-61, bibl. 11, illus. [Waite Agric. Res. Inst., Univ. Adelaide]

The changes of soil moisture to a depth of 5 ft. in a simple crop rotation (bare fallow/wheat/wheat) and under permanent pasture (mainly *Phalaris tuberosa* and annual subterranean clover) were followed in detail from 1948-50. It is shown that the equation given could be used, in the experiments, to express the relationship between evapotranspiration, evaporation from water, storage of water in the soil and rainfall. Water losses from a bare fallow were found to be determined principally by rainfall and soil storage.—From authors' summary.

1040† DANIEL, F. R. **Investigations within Wyangala Catchment area.** *J. Soil Conserv. N.S.W.* 1955, **11,** No. 1, 37-47, bibl. 6, illus.

A survey of the Wyangala Catchment area has shown that sheet, gully and river bank erosion, also mass movements of the soil, occur. The factors which contribute to the erosion hazard, such as land use, vegetation and climate are being studied and their distribution mapped. The land is used mainly for sheep and cattle grazing. Poor pasture management and denudation of the vegetation are the main causes of erosion. Recommendations are made for the restoration and maintenance of a protective vegetative cover.—M.P.

1041† NEWMAN, J. C. **Tumut Catchment area. Survey of vegetation and erosion. Part 2.** *J. Soil Conserv. N.S.W.* 1955, **11,** No. 2, 48-61, illus.

The land use of this area corresponds closely to the 3 natural, altitudinal, sub-divisions. The sub-alpine belt is of great value for relief-grazing in summer and, like the forest area, is a great source of sediment-free water for irrigation. The forested belt is also used for relief-grazing, mostly under lease and in summer. The natural pastures are composed of *Poa australis, Themeda australis* and *Pentapogon quadrifidus*. The stocking rates are low, the cattle being mostly in the timbered country and sheep in the more open areas. The timbered area plays an important part in soil retention and stabilization. The agricultural and pastoral lowland is small in area and has nearly all been cleared of the virgin vegetation of *Eucalyptus* spp. Broom millet, maize and sweet-corn are grown on the alluvial lands. Cropping is intensive, without fertilizer application and rarely with the inclusion of pastures in the rotation. The area of lucerne grown is small because the land is liable to occasional flooding. Native pastures are composed mostly of *Themeda australis, Danthonia pilosa* and *Bothriochloa ambigua*, and native clovers are also abundant. Improved pastures occur on the cleared hill country and could be extended with advantage since the pasture potential is greater than has been reached so far.—M.P.

WEEDS AND WEED CONTROL

1042 NEUBAUER, B. H. F. Über einige beachtenswerte Feldunkrauter in Afghanistan und ihre landwirtschaftliche Bedeutung. [**Some noteworthy weeds of arable land in Afghanistan and their agricultural importance.**] *Angew. Bot.* 1954, **28,** No. 5, 171-7, bibl. 2, illus.

1043† EDWARDS, J. C. and SRIVASTAVA, R. N. **Weeds of the Allahabad Agricultural Institute campus. 1. Kharif season.** *Allahabad Fmr* 1954, **28,** No. 3, 86-100. [Allahabad Agric. Inst., India]

Notes are presented on each of the weeds identified on the college campus during the monsoon season. They include Gramineae and Leguminosae. Mention is made, where appropriate, of the use of the weed plants as human and animal food in times of food shortage or famine.—W.J.B.

1044 TRAUTMANN, W. Über den Einfluss von Bodenreaktion, Kali und Phosphorsäure auf die Verteilung der Ackerunkraüter im Göttinger Gebiet. [**The influence of soil reaction, potash and phosphoric acid on the distribution of field weeds in the Göttingen district.**] *Z. PflErnähr. Düng.* 1954, **66,** No. 3, 247-61, bibl. 3. [Univ. Göttingen]

The phosphoric acid, K and pH status of the soils of 123 cultivated fields in the district were studied in relation to the weed population. The work was based on Ellenberg's system of ' reaction groups ' in which weeds are considered as indicators of climatic and soil conditions. Results for 71 of the most important weed species in the region are fully tabulated and a comparison made with Ellenberg's classification. Only in the extreme pH ranges were the results in agreement, the remainder being more variable. Typical examples are cited. Technical difficulties were encountered in K and phosphoric-acid determinations and the results were inconclusive. The author suggests that weeds are more exacting in pH than in the other two environmental factors considered.—M.P.

1045 SHIMIZU, M. **The synecological investigation of weeds in acid-soil and limestone region. 2** [Japanese] *Sci. Bull. Fac. Agric., Kyushu* 1955, **15,** No. 1, 35-45, bibl. 30, English summary pp. 44-5.

Weed species growing on waste land, reclaimed land and farm land on acid-soil and limestone regions in Japan are tabulated.—W.J.B.

1046 KASAHARA, Y. **Studies on the weeds of arable land in Japan, with special reference to kinds of harmful weeds, their geographic distribution, abundance, life-length, origin and history.** *Ber. Ōhara Inst.* 1954, **10,** No. 2, 72-109, bibl. 90, illus.

1047 COUPLAND, R. T. and ALEX, J. F. **Distribution of the underground parts of leafy spurge (*Euphorbia esula* L.).** *Canad. J. agric. Sci.* 1954, **34,** No. 2, 161-76, bibl. 11. [Univ. Saskatchewan, Saskatoon]

Data are given of the underground distribution of *Euphorbia esula*, as determined in excavations on 32 sites in southern Saskatchewan. To a depth of 48 in., the weight of oven dry plant material averaged 22·11 ± 2 g. per cu. ft., or a total of 8492 lb. per ac., of which 56% was found in the top 6 in. of soil, and 17% in the 6-12 in. layer. The total weight of plant material and the largest proportion of the total in the top 6 in. of soil was greatest in invaded natural grassland, and least on arable land. The weight of underground parts of this weed at all depths was greatest in native grassland. In almost all cases, the roots of *E. esula* penetrated to depths of 48-98 in. in the soil. The depth of accumulation of $CaCO_3$ in the soils studied was such as to lead to the conclusion that leaching of soil sterilants could not be expected to reach the maximum depth to which *E. esula* roots reached, or even to the maximum depth at which reproductive buds were formed. Cultivation appeared to reduce the proportion of roots with diameters larger or smaller than 0·6-5 mm. It appeared to be more effective to use cultivation rather than a competing grass sward to reduce the vigour of the root system of *E. esula*.—P.J.B.

1048 CIFERRI, R. and PIGNATTI, S. Nuova specie di giavone apparsa nelle risaie del Pavese. [**A new species of *Echinochloa* which has appeared in rice-fields of the Pavia region.**] *Riso* 1955, **4,** No. 2, 18-19.

Specimens of a new species of *Echinochloa* [*Panicum*], *E. crus-pavonis*, were found for the first time in Europe in rice-fields of the Pavia region, where they had flowered and seeded. *E. crus-pavonis* was so far known only in the tropical and subtropical regions of America. The botanical characters of this species, which distinguish it from other *Echinochloa* species, are given.—E.B.O.

1049 WILHELM, S. and BENSON, L. C. **Weeds as important interim hosts of broomrape.** *Pl. Dis. Reptr* 1955, **39,** No. 3, 273, bibl. 3. [Pl. Path. Dep., Univ. Calif., Berkeley]

Observations showed that broomrape (*Orobanche ramosus*) was able to attack and to mature its seed on *Solanum sarachoides*, *Amaranthus retroflexus* and *Xanthium spinosum*.—P.J.B.

950† Hodgson, H. T. **Weeds in Alaska.** *Bull. 600. Alaska agric. Exp. Sta.* 1954, pp. 35, illus.
wenty-one major weeds of Alaska are described, ith illustrations, and recommendations are made r their control.—P.J.B.

951† García, A. El herbicida 2,4-D. [**2,4-D.**] *Agricultura* 1955, No. 273, 8-15, illus.
list is given of common weeds of pastures and able crops in Spain which can be controlled by e use of 2,4-D.—W.J.B.

952† England and Wales Ministry of Agriculture and Fisheries. **The control of rushes.** *Adv. Leafl. 433. England and Wales Minist. Agric. Fish.* 1955, pp. 5.

953† Thurston, Joan M. **A survey of wild oats (*Avena fatua* and *A. ludoviciana*) in England and Wales in 1951.** *Ann. appl. Biol.* 1954, **41,** No. 4, 619-36, bibl. 12, illus. [Rothamsted Exp. Sta., Harpenden, Herts]
621 samples of wild oats, collected in England d Wales by N.A.A.S. and N.I.A.B. officers, ly two species (*Avena fatua* and *A. ludoviciana*) ere found but both were very variable. *A. fatua* curred in all wheat- and barley-growing areas, both winter and spring corn and on all soil types. *ludoviciana* occurred (with two exceptions) only thin approximately 80 miles radius of Oxford, ainly on heavy soils and chiefly in winter corn. ne amount of wild oats present appeared to epend on the frequency in the rotation of corn other crops in which wild oats would shed seed. eep ploughing often increased the infestation. ne data did not show whether a field could be eed of wild oats by grassing down for a number years, nor what is the maximum period of survival of buried wild oat seeds.—Author's summary.

954 Hood, P. J. K. **Chemical control of couch grasses (*Agrostis alba* and *Agropyron repens*). A preliminary trial.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 3.
trials in Oxfordshire, the following TCA and dium chlorate treatments were applied in spring : ngle and split TCA treatments of 20 or 30 lb. r ac., single and split applications of 30 and 60 lb. dium chlorate per ac., all applied in 30 gal. ray volume. These treatments were combined ith : (a) no cultivation, (b) cultivation before rst spraying (21 April), (c) cultivation before rst and second spraying (19 May), (d) cultivation ter first spraying and (e) cultivation after first d second spraying. The best control of *A. repens* d *A. alba* followed split treatments with TCA the 15 lb. per ac. rate for each treatment, mbined with cultivation immediately before plication. Cultivation after treatment was, in ost cases, inferior to cultivation before treatment. Where no cultivations were done, TCA was markedly superior to sodium chlorate ; where one cultivation was carried out with one herbicidal treatment, differences were less. Where split treatments were combined with two cultivations, 60 lb. sodium chlorate was almost as effective as 30 lb. TCA. TCA tended to be more effective against *A. repens* than *A. alba* ; with sodium chlorate, the opposite was the case. TCA was ineffective against certain other weeds present, including bladder campion [*Silene inflata*], bindweed [*Convolvulus arvensis*] and charlock [*Sinapis arvensis*], while sodium chlorate was very injurious to *S. inflata*. Neither herbicide had any apparent affect on kale sown subsequently.—P.J.B.

1055 Wiancko, M. R. **Chemical control of couch grass.** *Proc. 7th East. Sect. nat. Weed Cttee, 1953* 1954, 158-63. [Domn Exp. Sta., Kapuskasing, Ont.]
The results are given of observations in Ontario on the use of TCA, CMU and maleic hydrazide for controlling *Agropyron repens*. Autumn applications of TCA at rates of 30, 40 and 50 lb. per ac., combined with cultivation, had no effect on *A. repens* stands. Applications of CMU at rates ranging from 10 to 100 lb. acid equivalent per ac. were made to a sward heavily infested with *A. repens*, on 18 September, 1952. By 9 September, 1953, treatment with 10, 20, 35 and 50 lb. CMU per ac. had resulted in stands 11·5, 3·5, 1·5 and 0·5%, respectively, of the original *A. repens* stands. In further trials, 40 lb. CMU per ac. were applied on 31 July, 18 August and 15 September and each plot was ploughed 3 times after treatment. Control of *A. repens* was best after treatment on 31 July, but the residual effect on crops sown during the following year was also highest following this treatment. Applications of 4, 8 and 16 lb. maleic hydrazide per ac., made in early July, followed by ploughing within 3 days, reduced *A. repens* stands by 72% in early September. Studies were made on the residual effect of applications of 20, 40, 80 and 100 lb. CMU per ac., made either in the spring or autumn of 1951. The 20 and 40 lb. per ac. treatments in spring, 1951, reduced *A. repens* stands to 5 and 1% of the original, respectively. Crops, including oats, barley, clover and turnips were grown on treated plots in 1953. All crops were killed on plots which had received 80 and 100 lb. CMU in spring, 1951. Oats on plots which had received 20 and 40 lb. CMU appeared normal, but barley was stunted and clover and turnips almost entirely eliminated. Following the autumn CMU treatments in 1951, oats were normal where 20 and 40 lb. were applied and barley was normal where 20 lb. per ac. were applied. The 20 lb. per ac. treatments caused slight kill of clover and considerable stunting in turnips. From these results, it was concluded that where over 20 lb. CMU were

applied, the cropping of treated areas was not advisable before 2 years had elapsed.—P.J.B.

1056 Osvald, H. and Åberg, E. **Recent experiments with herbicides for eradication of *Agropyron repens* P.B.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 7, bibl. 3. [Roy. Agric. Coll., Uppsala, Sweden]

In 2 experiments in 1953 in Sweden, sodium chlorate and TCA were compared for their control of *A. repens* and their effect on subsequent crops. Treatments were as follows : (a) no treatment, (b) 200 kg. sodium chlorate per ha., (c) 90% NaTCA at 100 kg. per ha. and (d) 90% NaTCA at 50 kg. per ha. Following treatment on 29 May of bare fallow on rather heavy clay soil, weed frequency on 5 August on a scale 0-10, where 10 = complete weed cover, was 2·2, 0·7, 0·9 and 1, respectively. The major weed present was *A. repens* and there was some *Convolvulus arvensis*, *Matricaria inodora* and *Sinapis arvensis*. On 21 August, one half of each plot was sown with turnip rape and the other half on 8 September with wheat. Following treatments (a), (b), (c) and (d), crop stands on 11 May on a scale 0-10, where 10 = full stand, were 9, 0·7, 7·3 and 9 for turnip rape and 3·7, 1, nil and nil for wheat, respectively. Thus, sodium chlorate damaged both crops ; TCA completely killed the wheat, but had little effect on the turnip rape. In a second trial the same treatments were made on 8 September and crops of turnip rape and spring wheat were sown on 10 May. No determinations on weed control were possible. Turnip rape yields on 17 August following treatments (a), (b), c) and (d) were 960, 534, 722 and 786 kg. per ha. and wheat yields were 4333, 2967, 2589 and 3348 kg. per ha., respectively. It was clear that neither herbicide was completely eliminated from the soil during winter and that injury was caused to both crops. In experiments started in 1954, on rather heavy clay soil, the following treatments were used : (a) no treatment, (b) 200 kg. per ha. sodium chlorate, (c) NaTCA at 50 kg. per ha., (d) NaTCA at 100 kg. per ha., (e) Na salt of Dalapon (2,2-dichloropropionic acid) at 25 kg. per ha., (f) Na salt of Dalapon at 50 kg. per ha. Spring applications were made on 28 May. The frequency of *A. repens* on a scale 0-10 on 13 August was 0·26, 0·13, nil, 0·03, 0·06 and nil, respectively. Turnip rape, winter rye and winter wheat were sown on the treated plots on 20 August. Observations on 23 September showed that no sodium chlorate treatment had injured the turnip rape, but had badly damaged the wheat. The TCA treatments injured both wheat and rye. Dalapon caused no damage to either turnip rape or wheat. In further trials on sandy soil, treatments applied on 25 May included 15, 30, 45 and 60 kg. Dalapon per ha. The effect of Dalapon in reducing *A. repens* stands was not obvious until August. Small amounts of Dalapon (1·5 - 7·5 kg. per ha.) applied in early spring had a detrimental effect on pea crops. It was concluded that for the control of *A. repens* in Sweden, sodium chlorate should be replaced by TCA and Dalapon. Where winter rape is to be sown after bare fallow, TCA at rates of 50 kg. per ha. should be applied in spring. Dalapon, at 50 kg. per ha., applied in spring, could be used in the same way as TCA. No data were available to indicate its value as an autumn treatment.—P.J.B.

1057 Jary, S. G. **Further developments in the use of TCA.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 5. [Pest Contr. Ltd]

In trials at a large number of locations in England on the non-selective use of TCA, applications of 90% NaTCA at rates of 20, 25, and 30 lb. per ac. were made in spray volumes ranging from 20 to 100 gal. per ac. ; in most cases, treatments were made between late September and mid-December 1953, on land intended for sowing to cereals during the following spring. Control of *Agropyron repens* was improved by cultivation, followed by application of TCA to the moist soil surface. In most cases increasing the rate of TCA applied increased the degree of weed control. For given rates of treatment, high-volume applications were superior to low-volume applications. Treatments with 20 lb. TCA in 20 gal. spray volume per ac. rarely gave effective control. Best results were obtained on heavy soils, on which 30 lb. TCA in 100 gal. spray volume per ac. gave virtually complete control of *A. repens*. On light soils, two applications of 20 lb. TCA per ac., separated by 4-6 weeks, gave better control than one 30 lb. per ac. treatment. Control of *A. repens* on fen soils was very poor. Retention of TCA in such soils was very marked and caused failures of spring cereals. Except on fen soils, TCA had no adverse effect on spring cereals sown 10-12 weeks after treatment. In trials with potatoes, applications of 20 lb. TCA per ac. were made on 8 April to land heavily infested with wild oats. The potatoes were within a few days of breaking through the soil and wild oat plants up to 4 in. high were present. On 18 June, wild oat stands were reduced by about 75%. Potato growth was slightly retarded, though no effect on tuber yield was noted. Sugar-beet in the 6-8-leaf stage was sprayed with 15 and 30 lb. TCA per ac. Growth of the sugar-beet was checked for 6-8 weeks, while the growth of *A. repens* was seriously retarded.—P.J.B.

1058 De Sousa, A. E. Erradicação de *Cyperus rotundus* L., pelo acido 2,4-diclorofenoxiacético (2,4-D). [**Eradication of *Cyperus rotundus* by 2,4-D.**] *Garcia de Orta, Lisbon* 1954, **2**, No. 1, 23-38, bibl. 24, illus. English summary p. 37.

aboratory and field experiments were carried out which the ammonium salt of 2,4-D was applied the weed *Cyperus rotundus* at various stages of rowth. In the first experiment, in which 2,4-D was plied to *C. rotundus* growing in pots at concenations of 0·1, 0·2, 0·3, 0·4, and 0·5%, the hercide was applied to one lot of plants in 6 sucssive doses at intervals of 7 days, and to a second t at the beginning of the experiment and whenver there was a growth of new shoots. In the case both lots, the 0·4% and 0·5% concentrations ere the most effective, and there was no difference etween the effect of these two concentrations. he above-ground portions of plants not fully rown, treated with 0·4 or 0·5% 2,4-D every 7 ays (lot 1), died at the end of the sixth week of eatment. There was no formation of new tubers ut the formation of new shoots was more rapid an in untreated plants. Where fully-grown plants ere treated, only 20% died off; the remaining)% flowered. In lot 2, the above-ground portions plants not fully grown, died off 7 weeks after e first treatment with 0·4 or 0·5% 2,4-D and new oots were destroyed by single applications. gain, there was no formation of new tubers but ew shoots grew more rapidly than in the case of ntreated plants. Fully-grown plants in lot 2 were ot prevented from flowering by the application 0·4 or 0·5% 2,4-D. In the second (laboratory) xperiment, in which 0·4% 2,4-D was applied at e beginning of the experiment and whenever ere was re-growth, the results were the same as in e case of lot 2 in the first experiment. It was oted in this experiment that the abundant root evelopment which took place in the untreated ants did not take place in the treated ones. The bers of the treated plants produced new shoots uch more rapidly than those of untreated plants. n the third (field) experiment in which an applicaon of 0·4% 2,4-D to *C. rotundus* was followed by milar applications whenever new shoots appeared, e aerial parts of all immature *C. rotundus* plants ere killed by the first treatment. New shoots were lled by 3 further applications. Two months after e last application no living plants remained except ose which were mature at the time of treatment; y this time the majority of the tubers of plants lled by treatment had disintegrated.—W.J.B.

059 ALLEN, H. P. and SMITH, W. N. **The effects of CMU and PDU on lalang-grass (*Imperata cylindrica*) in Malaya.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 18. [Plant Protection, Ltd.]

reatments used in these trials included: 20, 40,) and 80 lb. CMU and PDU, both as 80% dispersble powders in 100 gal. water, 50, 100, 150 and 00 lb. Na TCA per ac. in 100 gal. water and a) : 50 petroleum aromatic/diesel oil mixture at tes of 100, 250 and 400 gal. per ac. Studies were also made of the effect of slashing and "chipping" (root-hoeing) on herbicidal effectiveness, and the relative effects of different spray volumes and of mixtures of PCP and CMU. CMU was ineffective for controlling *I. cylindrica*; at 6 months after treatment, only the 80 lb. rate of CMU kept regrowth down to below 20% of complete stands. PDU was inferior to CMU and the residual effect of CMU was less than expected. Na TCA was ineffective at rates of 50 lb. per ac., gave only fair results at 100 lb. per ac., but was very effective at rates of 150 and 200 lb. per ac., even at 6 months after treatment. Single treatments with the 50 : 50 aromatic oil/diesel oil mixture, even at rates as high as 400 gal. per ac., gave poor control of *I. cylindrica*, though the initial effects were good. Granulated CMU used in one trial was inferior to the dispersible powder formulation. With TCA, slashing before application reduced herbicidal effectiveness; with CMU and PDU, slashing and slashing + "chipping" slightly increased their effectiveness. There were no consistent effects on herbicidal effectiveness of varying the spray volume. Adding 3·2 lb. PCP to 40 or 80 lb. CMU or PDU per ac. slightly increased the rate of kill of above-ground parts of the plants and gave slightly better results than where PCP was omitted.—P.J.B.

1060 STEVENS, O. A. **Late lambsquarters—"*Chenopodium strictum*"** *Bimon. Bull. N. Dak. agric. Exp. Sta.* 1955, **17,** No. 3, 108-10, illus.

A note is given on *C. strictum*, a late-maturing species of *Chenopodium*, which has become abundant in N. Dakota.—P.J.B.

1061 MELANDER, L. W. and others. **Killing native barberry with hormone-type herbicides.** *Weeds* 1954, **3,** No. 2, 123-30, bibl. 12, illus. [Pl. Pest. Contr. Br., Agric. Res. Serv., U.S. Dep. Agric., Minneapolis, Minn.]

In trials in Colorado and the Virginias, a large number of different formulations of 2,4-D and 2,4,5-T (with and without detergent and acetic-acid additives), 4-chloro-o-toloxyacetic acid and sodium chlorate were tested for the control of *Berberis fendleri* and *B. canadensis*. In foliage-spray tests on *B. fendleri* 2,4-D ammonium salt, triethanolamine salt + acetic acid and detergent, isopropyl ester, isopropyl ester + acetic acid and 2,4,5-T butyl ester, butyl ester + acetic acid and pentasol ester (from mixed amyl alcohols) + acetic acid were all effective, though *B. fendleri* appeared to be relatively less tolerant of 2,4-D salts and, in particular, esters. Early and mid-season treatments were more effective than late-season treatments. In field-scale trials, foliage sprays containing 2,4-D isopropyl ester killed all above-ground parts of the plants and resulted in less than 5% re-

growth after 6 years. Foliage sprays with 2,4-D and 2,4,5-T did not give consistent control of *B. canadensis*, though for field use, foliage sprays of 10·5 lb. acid equivalent of 2 parts 2,4-D to 1 part 2,4,5-T + PCP in 100 gal. oil, applied at a rate of 110 gal. per ac., were effective for year-round use. This treatment, applied as a dormant-season spray, resulted in 95% kill of both *B. fendleri* and *B. canadensis*. 2,4-D esters, alone, in oil, were effective against *B. fendleri*, but not against *B. canadensis*.—P.J.B.

1062 REA, H. E. **The control of established Johnson grass in non-cropland.** *Proc. 7th South. Weed Conf. 1954* 53-8. [Texas Agric. Exp. Sta., College Station]

The results are given of trials with a number of oil sprays to control thick stands of Johnson grass [*Sorghum halepense*]. Grass 12 in. high was sprayed with 100 gal. per ac. of Lion 6, Lion 7, Tulsa and Toxisol A oils, or oil/water emulsions, in a ratio of 1 : 2, or 1 : 3. Effective kill of the grass was obtained. Diesel oil treatments at similar rates were relatively less effective, though diesel oil + 1 pt. DNOSBP and diesel oil containing 5% PCP were very effective. Efficient contact-herbicide sprays were very effective as preliminary treatments before spraying with herbicides having a residual effect. Observations are made on the use of TCA treatments for controlling Johnson grass. Summer treatments with 10 lb. Dalapon per ac., made to Johnson grass re-growth when 8 in. high, prevented re-growth of 80% of the treated plants. Applications of soluble chlorate/borate herbicidal mixtures in a ratio of 1 : 3, at a rate of 3 lb. per 100 sq. ft., have given almost complete control of old stands and seedlings for 18-36 months. Where concentrated Borascu (a relatively insoluble material) has been used, rates of 9 lb. per 100 sq. ft. have given best results. Trials with CMU as a soil sterilant indicated that control for one, two and three seasons could be expected following applications of 12-36 lb., 48-64 lb. and 72, or more, lb. per ac., respectively.—P.J.B.

1063 STEPHENS, J. C. and others. **Blended solvents for control of the submersed water weed naiad in south Florida.** *Weeds* 1954, **3,** No. 2, 160-70, bibl. 6, illus. [Everglades Agric. Exp. Sta., Florida]

1064 PAIXAO, J. DA C. Reação da *Emilia sonchifolia* D.C. a diversos herbicidas. 1. Ação dos sais sódicos do 2,4-D o ortoclorofenoxiacético e do T.C.A. 90%. [**Reaction of *Emilia sonchifolia* to various herbicides. 1. Reaction to sodium salt of 2,4-D, orthochlorophenoxyacetic acid and 90% TCA.**] *Agronomia* 1954, **13,** No. 2, 167-76, bibl. 6, illus. [Univ. Rural, near Rio de Janeiro]

The arable weed *E. sonchifolia* was specially cultivated on plots before receiving the following spra treatments : (a) 0·01 molecular normal solution sodium salt of 2,4-D in water ; (b) sodium salt TCA (90%) in a concentration of 6% in wate (c) 0·01 molecular normal solution of sodium salt orthochlorophenoxyacetic acid in water. Contr plots were left untreated. The sprays were applie on 2 June, 1953, and the final observations of t plots were made on 16 July, 1953. The percenta of *E. sonchifolia* killed on (a), (b) and (c), respe tively, were 98·2, 68·9 and 32·4%. 19% of *sonchifolia* plants on untreated plots had died b 16 July. Thus treatment (a) (2,4-D) gave goo control of the weed and significantly better contr than any other treatment.—W.J.B.

1065 WORT, D. J. **Influence of 2,4-D on enzym systems.** *Weeds* 1954, **3,** No. 2, 131-5, bib 33. [Bot. Dep. Univ. British Columbia]

The effect of 2,4-D on the enzyme systems o plants is discussed and a table is given summarizin the effect of 2,4-D on specific enzyme systems i different plant species and parts of plants, as re ported in the literature.—P.J.B.

1066† LEVI, E. **Some aspects of the toxicity o 3-(*p*-chlorophenyl)-1,1-dimethylurea (CMU to plants.** *Aust. J. agric. Res.* 1955, **6,** No. 1 26-32, bibl. 1, illus. [C.S.I.R.O., Irrig. Res Sta., Griffith, N.S.W.]

The annuals and perennials used in the trials wer *Phaseolus vulgaris, Hordeum vulgare, Sorghum halepense* and *Paspalum distichum*. Results showe that CMU killed the plants rapidly when it wa applied as a wettable powder to the soil, actin through the root systems of the plants, causin desiccation and leaf abscission. The time taken fo a complete kill varied with the species and en vironmental conditions.—M.P.

1067 HAUN, J. R. and PETERSON, J. H. **Trans location of 3-(*p*-chlorophenyl)-1,1-dimethyl urea in plants.** *Weeds* 1954, **3,** No. 2, 177-87 bibl. 4, illus. [Grasselli Chem. Dep., E.I. du Pont de Nemours and Co., Wilmington Del.]

Tomato plants were grown in nutrient solutions to which CMU, labelled with C^{14} as a tracer, had been added, to study the translocation of CMU within the plants. Rapid upward translocation o CMU from the roots was noted ; translocation downwards from the leaves was almost nil. In similar trials using maize and *Sorghum halepense* seedlings, the same trends were noted. These experiments did not establish whether the intact CMU molecule, itself, was translocated within the plants.—P.J.B.

1068 BRIAN, R. C. **Adsorption and growth regulation.** *Paper read at 2nd Brit. Weed Contr*

Conf. 1954 pp. 4. [I.C.I. Ltd., Bracknell, Berks, England]

A study was made of the relation between the susceptibility of different plant species to MCPA and the amount of this herbicide adsorbed to surfaces within the plant tissues, including membranes, macromolecules and to other soluble and colloidal components of the protoplasm. Adsorption forces within the plant are itemized and particular emphasis in these studies is laid on ion-ion interaction, reinforced by Van der Waals forces. A Langmuir trough was used to study the adsorption of MCPA to liquid films from different parts of plants spread on a buffer solution, and to monolayer films of simple, long-chain molecules. MCPA was adsorbed to amines and quaternary ammonium salts, and, to a lesser degree, to ketones and also to a protein (gliadin). It was suggested that the lipoidal status of plants may influence the biological activity of MCPA in plants. Resistant plant species, such as oats, wheat, ryegrass, mayweed [*Matricaria* sp.] and groundsel [*Senecio vulgaris*] all produced films with a relatively high capacity to adsorb MCPA. Of susceptible plants, certain of them, including broad beans and sugar-beet, had low capacities for adsorbing MCPA ; exceptions were rape and mustard, which strongly adsorbed MCPA. It was concluded that plants resistant to MCPA could contain up to 10 times more of the herbicide than susceptible species. Rape and mustard, though strongly adsorbent of MCPA, contained only small amounts of adsorbing material. It is thought, therefore, that there is a correlation between the total adsorption of MCPA within a plant and its resistance to MCPA. The presence of material which adsorbs MCPA readily within the plant was thought to impede its translocation to other and vulnerable parts of the plant. —P.J.B.

1069 Tibbitts, T. W. and Holm, L. G. **Accumulation and distribution of TCA in plant tissues.** *Weeds* 1954, **3,** No. 2, 146-51, bibl. 6. [Hort. Dep., Univ. Wisconsin, Madison]

Test plants used were : snapbeans and millet (very sensitive to TCA), peas (moderately sensitive) and red beet (tolerant of TCA). The plants were grown in pots and TCA was added to the soil 5 days before the time when there was sufficient growth to enable 50 mg. of tissue to be taken for sampling. Four-weeks-old snapbeans contained about 1 mg. TCA per g. of fresh tissue in the terminal buds and young, enlarging leaves. Terminal buds and young leaves were severely injured by the TCA, while stems, mature leaves and roots were uninjured and had very low TCA contents. No TCA in measurable amounts was found in the terminal buds, terminal leaflets or roots of peas, while the mature leaves had a content of 441 micrograms TCA per g. fresh tissue. With millet, about 50 micrograms TCA per g. fresh tissue were found in the elongating stem and apex, mature leaf blades, and roots. In beet plants, about 35 micrograms of TCA per g. fresh tissue were found in all parts sampled. The beet plants were unaffected by the TCA, while millet plants were severely injured.—P.J.B.

1070 Currier, H. B. and Peoples, S. A. **Phytotoxicity of hydrocarbons.** *Hilgardia* 1954, **23,** No. 6, 155-73, bibl. 37, illus.

1071 Wain, R. L. **Selective weed control—some new developments at Wye.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 10, bibl. 7, illus. [Wye Coll., Univ. London]

Observations are made on the physiological activity of homologues of ω-(2-methyl-4-chlorophenoxy) acetic acid, as indicated by wheat cylinder elongation, pea curvature and tomato leaf epinasty tests. The acetic, butyric, caproic and octanoic homologues showed activity, while the propionic, valeric and heptanoic homologues did not. The activity of these compounds is discussed in relation to the beta oxidation system of plants. It has been shown that phenoxy acids with an odd number of methylene groups in the side chain are degraded by the beta oxidation system to the active acetic derivative ; other homologues are converted to the inactive parent phenol. It was found that the beta oxidation systems present in pea and tomato tissue were unable to degrade the side chain of substituted phenoxy acids with odd numbers of methylene groups, though they could do so if other types of ring substitution were present. Experiments have shown that different γ-phenoxybutyric acids will destroy certain plant species which possess beta oxidative systems able to degrade these substances to active acetic derivatives, while other species not possessing the requisite beta oxidative system remain unaffected. The results are given of experiments to test the effect of the 4-chloro-, 2,4-dichloro-, 2-methyl-4-chloro-, 3,4-dichloro-, 3-methyl-4-chloro-, 2,5-dichloro, 2,3,4-trichloro-, and 2,4,5-trichloro-derivatives of γ-phenoxybutyric acid. It was concluded that some of these substances, particularly γ-(2-methyl-4-chlorophenoxy) butyric acid (MCPB) and γ-(2,4-dichlorophenoxy) butyric acid (2,4-DB) had considerable potentialities as selective herbicides. Preliminary trial results indicate that carrots, flax and peas are much less damaged by MCPB than by MCPA or 2,4-D ; 2,4,5-TB was safe to use on peas at a rate of 2 lb. per ac. Important weeds controlled by MCPB and 2,4-DB include annual nettle [*Urtica urens*], creeping thistle [*Cirsium arvense*], fumitory [*Fumaria officinalis*], fat hen [*Chenopodium album*] and charlock [*Sinapis arvensis*]. 2,4,5-TB is less active against these species than MCPB or 2,4-DB.—P.J.B.

1072 Carpenter, K. and Soundy, Margery. **Investigations into the practical value of MCPB as a selective weed-killer in leguminous crops.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 19, bibl. 7, illus. [May and Baker Ltd.]

In greenhouse tests with a number of substituted phenoxy butyric acids, the following ω-phenoxyalkyl-carboxylic acid derivatives were found active enough to be tested further in field trials : 4-chlorophenoxy butyric acid (4-ClB), 2,4-dichlorophenoxybutyric acid (2,4-DB), 3,4-dichlorophenoxybutyric acid (3,4-DB) and 4-chloro-2-methylphenoxy butyric acid (MCPB). Of these materials, MCPB and 2,4-DB appeared to offer most promise, particularly for weed control in legumes. MCPB and 2,4-D were both effective for the control of creeping thistle [*Cirsium arvense*]. In comparisons of MCPA with MCPB, activity against *C. arvense* shoots was similar for both herbicides ; against cruciferous weeds, MCPB was less active than MCPA at rates of 0·5 lb. per ac., while at 1 lb. per ac., both materials were equally effective and control was virtually complete. In the case of other annual weeds susceptible to MCPA, MCPB was equally effective at rates of 1 lb. per ac. Chickweed [*Stellaria media*], scentless mayweed [*Matricaria inodora*] and groundsel [*Senecio vulgaris*] were almost completely resistant to MCPB. In preliminary screening trials, MCPB, 3,4-DB, 4ClB and 2,4,5-TB were all fairly non-toxic to peas, but 3,4-DB and 2,4,5-TB were ineffective against weeds. 4ClB was slightly injurious to peas at rates sufficient to give weed control. MCPB was the best of this series. In the field MCPB caused some initial growth check and slight stem deformity, but recovery was rapid. 2,4-DB was much more toxic to peas than MCPB.—P.J.B.

1073 Hellquist, H. and Bengtsson, A. **Some observations on the relationships between spraying technique and biological efficiency.** *Paper read at 2nd Brit. Weed Contr. Conf., Harrogate 1954* pp. 5, bibl. 5. [Nat. Pl. Protection Inst., Branch Sta., Umea, Sweden]

Observations are made on the behaviour of spray droplets applied to leaf surfaces. Data are given of the spray retention on barley and peas of sprays with a surface tension of 50 and 35 dyn/cm., applied at different spray volumes. The results showed that at any given droplet size, a greater proportion of liquid was retained on the plants at a low than at a high spray volume. The differences in retention at high and low spray volume were more marked in plants with low wettability (large contact angle) than in those with a high wettability. The percentage of spray retained on the plants was considerably affected by the surface tension of the spray. Small droplets were retained on plants better than large droplets. The differences were greatest in the case of plants, such as *Chenopodium album*, with low wettability, than in plants, such as *Sinapis arvensis*, with high wettability. Field and laboratory experiments were made on the effect of MCPA on peas, linseed and cereals and of DNOSBP on peas, where spray volume and droplet size were varied. Peas and linseed showed a stronger reaction to low-volume than to high-volume sprays. Experiments on linseed with DNOSBP showed that, in some cases, spray volumes of 100 l. per ha. could kill the crop, while the effect of 900 l. per ha. spray volumes were much less injurious. Droplet size did not appear to affect the reaction of cereals to MCPA. With peas, MCPA treatments with small droplet size caused considerably more damage to the crop than the use of medium or large droplet size ; this was also the case with DNOSBP applied to flax and linseed.—P.J.B.

1074 Leinweber, C. L. and McCully, W. G. **An inexpensive controlled-environment chamber for herbicide research.** *Weeds* 1954, **3,** No. 2, 143-5, bibl. 4, illus. [Texas Agric. Exp. Sta., College Station]

The apparatus described consists basically of a household refrigerator for cooling and drying, and a plant cabinet fitted with lights and with provision for temperature and humidity control.—P.J.B.

1075 Ries, S. K. and Jacob, W. C. **Design and analysis in chemical weed control research.** *Weeds* 1954, **3,** No. 2, 152-9, bibl. 12. [Michigan Agric. Exp. Sta., East Lansing]

A review is given of a number of principles in the design and analysis of weed-control trials. Aspects considered include : selection of treatments, plot size and shape and number of replications, greenhouse studies, plot layout, type of observations to be taken and analysis of data.—P.J.B.

1076 British Weed Control Conference. **Proceedings of the 2nd Meeting, 1954.** 1955, Vol. 1, pp. 345 ; Vol. 2, pp. 347-550, append. pp. 73.

Papers presented included :

1. The present position of herbicides in British agriculture. By W. G. Templeman, pp. 3-11, bibl. 13. [See Abs. 654.]
2. Recent advances in weed control in the United States. By W. C. Shaw, pp. 23-45.
3. The use of herbicides in vegetable crops in Denmark, pp. 47-55. By H. I. Petersen.
4. Weed control in peas and lucerne with IPC and CIPC. By L. G. Spencer, pp. 151-6. [See Abs. 901.]
5. Observations on the control of weeds in peas following experiments carried out from 1949-1953. By J. M. Proctor and J. D. Reynolds, pp. 157-64. [See Abs. 899.]
6. An investigation into the possibilities of low

volume application of Dinoseb for weed control in peas. By J. D. Reynolds and others, pp. 165-76.
7. Preliminary experiments on chemical control of wild oats in peas. By P. Gregory and others, pp. 177-84. [See Abs. 898.]
8. Recent experiments with herbicides for eradication of *Agropyron repens* P.B. By H. Osvald and E. Åberg, pp. 187-93. [See Abs. 1056.]
9. Further developments in the use of TCA. By S. G. Jary, pp. 195-9. [See Abs. 1057.]
10. Chemical control of couch grasses (*Agrostis alba* and *Agropyron repens*). A preliminary trial. By P. J. K. Hood, pp. 201-3. [See Abs. 1054.]
11. Weed dispersal and persistence. By E. Salisbury, pp. 289-94.
12. Weed seed dispersal by machinery. By F. Coleman, pp. 295-300.
13. Selective weed control—some new developments at Wye. By R. L. Wain, pp. 311-20. [See Abs. 1071.]
14. Adsorption and growth regulation. By R. C. Brian, pp. 321-4. [See Abs. 1068.]
15. Investigations into the practical value of MCPB as a selective weed killer in leguminous crops. By K. Carpenter and M. Soundy, pp. 327-45. [See Abs. 1072.]
16. Methods and results of small scale testing of MCPA derivatives. By C. Frost and A. Gathergood, pp. 347-53. [See Abs. 625.]
17. The value of different isomers of phenoxyacetic acids and phenols and the effect of technical MCPA. By E. Åberg, pp. 355-60.
18. Techniques for the rapid evaluation of potential new herbicides. By K. Carpenter and others, pp. 363-9. [See Abs. 648.]
19. An experimental technique for investigating leaching of herbicides. By G. S. Hartley and P. O. Park, p. 373.
20. Spraying equipment for the experimental application of herbicides. By J. D. Fryer and J. G. Elliott, pp. 374-88. [See Abs. 655.]
21. Some observations on the relationships between spraying technique and biological efficiency. By H. Hellquist and A. Bengtsson, pp. 389-93 [See Abs.1073.]
22. Environmental factors affecting the response of barley to growth regulators. By S. Andersen, pp. 395-9.
23. Concerning the influence of cold periods on the effect of 2,4-D and MCPA on oats. By B. Rademacher, pp. 401-5. [See Abs. 810.]
24. The effects of MCPA (sodium) and 2,4-D (amine) applied to spring oats at the 1 to 3 leaf stage. By J. G. Elliott and J. D. Fryer, pp. 407-14. [See Abs. 809.]
25. Early spraying of spring oats with MCPA (potassium). By T. C. Breese and R. H. Hirst, pp. 415-24.
26. The application of herbicides in winter-rye and -wheat with special reference to the yield-stimulating effect of DNC. By P. Riepma, pp. 425-32.
27. The use of dinitro weedkillers on winter cereals. By R. Pfeiffer and others, pp. 433-45.
28. Chemical weed control in sugar beet. A report of experimental work in 1954. By C. Parker, pp. 447-53.
29. Calcium cyanamide as a herbicide in row crops. By B. Rademacher, pp. 455-6.
30. The use of sulphuric acid for controlling weeds in Brassica crops. By W. Q. Connold and E. I. Prytherch, pp. 457-66.
31. Weed control with DNC (sodium) and MCPA (sodium) in fibre flax in Denmark. By P. S. Frederiksen, pp. 467-73. [See Abs. 1004.]
32. Survey of Swedish experiences of chemical weed-killers used in fibre flax during the years 1940-1953. By K. Froier and H. Zienkiewicz, pp. 475-89. [See Abs. 1005.]
An appendix (pp. 73) contains the report of the Recommendations Committee and is divided into three parts. The first contains recommendations for weed control in growing crops and the second for the non-selective use of herbicides. The third part is devoted to general considerations, including herbicidal application, herbicides and the law, and new herbicides.—P.J.B.

1077 National Weed Committee. Canada. **Proceedings of the 7th Meeting, Eastern Section, 1953.** 1954, pp. 177.
Papers presented included :
1. Some patterns of weed distribution in Canada. By D. R. Lindsay, pp. 82-7. Maps are given of the distribution of *Cirsium arvense, Daucus carota, Axyris amarantoides, Setaria glauca, S. viridis* and *Sisymbrium altissimum.*
2. History and development of Endothal. By J. L. Poland, pp. 94-8.
3. Recent tests with chlorinated phenoxyethyl compounds as herbicides in established plants. By J. B. Harry, pp. 108-13.
4. Chemical control of couch grass. By M. R. Wiancko, pp. 158-63. [See Abs. 1055.]
5. Observations on the reaction of nutgrass (*Cyperus esculentus*) to various herbicides. By R. Bordekan, pp. 163-5.—P.J.B.

1078 Southern Weed Conference, USA. **Proceedings of the 7th Annual Meeting.** 1954, pp. 360.
Papers presented included :
1. Control of trumpet vines on cotton farms. By H. E. Rea, pp. 51-2. [See Abs. 984.]
2. Control of established Johnson grass in noncropland. By H. E. Rea. pp. 53-8. [See Abs. 1062.]
3. Control of established Johnson grass in cotton fields. By H. E. Rea, pp. 59-61. [See Abs. 985.]
4. Control of annual weeds and grasses in cotton. By H. E. Rea, pp. 62-7. The results are given of

pre-emergence herbicidal treatments, lateral oil treatment of young plants and post-emergence lateral and vertical applications of herbicides.

5. Substituted ureas for pre-emergence weed control in cotton. By M. B. Weed and others. pp. 68-87. [See Abs. 986.]

6. Comparative tests of CMU, D, M, and CIPC as pre- and post-emergence herbicides in cotton. By W. B. Albert and J. H. Anderson, pp. 88-92. [See Abs. 987.]

7. Comparative efficiency of CMU and other residual-type herbicides applied at lay-by for late season weed control in irrigated cotton. By C. L. Foy and others, pp. 93-6. [See Abs. 988.]

8. The control of annual morning glory and summer grasses in cotton with CMU. By H. F. Arle and E. H. Everson, pp. 101-4. [See Abs. 989.]

9. Some residual aspects of using DNOSBP and Lion Herbicidal Oil 1 for weed control in cotton for four years on a clay loam soil. By V. C. Harris, pp. 105-114.

10. Chemical weed control in Georgia. (Cotton—1953.) By J. T. Thompson and others, pp. 115-18.

11. Field studies during 1953 relating to the control of weeds in cotton in North Carolina. By R. P. Upchurch, pp. 119-24.

12. A report on chemical weed control in cotton for Louisiana. By C. H. Thomas and others, pp. 125-8.

13. A study of the interactions of cotton varieties and pre-emergence herbicides. By W. C. Normand, pp. 129-33. [See Abs. 990.]

14. The relationship between the anatomy of cotton hypocotyls and their responses to an herbicidal oil (abstract). By R. D. Palmer and W. B. Ennis, pp. 134.

15. Comparative " Premerge " pre-emergence and post-emergence treatments for control of annual weeds in peanut fields. By A. G. Witherspoon and E. G. Rodgers, pp. 151-3. [See Abs. 888.]

16. Ammonium nitrate solution, 2,4-D, dinitro and " Dupont M " for weed control in corn. By G. C. Klingman and J. C. Davis, pp. 167-73. [See Abs. 837.]

17. The herbicidal influence of 2,4-D, potassium chloride and wetting agents in unknown nitrate solution and the effect of wetting agents on surface tension. By J. C. Davis and G. C. Klingman, pp. 174-180.

18. Tolerance of transplanted sweet potatoes to several herbicides under low soil moisture conditions. By W. B. Albert, pp. 181-4. [See Abs. 973.]

19. Field performance of Dalapon, a new grass controlling herbicide. By A. J. Watson.

20. Some factors affecting the behaviour of dinitro herbicides in soils. By F. L. Davis and others pp. 205-7.

21. Some effects of rainfall and lime on the phytotoxicity of water-soluble dinitro. By D. E. Davis and F. L. Davis, pp. 208-11.

22. Effect of soil pH on activity of DNOSBP. By E. B. Hollingsworth, pp. 212-18. There was evidence that applications of 50 lb. Ca $(OH)_2$ per ac. to the soil surface was able to restrict up to 95% of the injury caused to cotton by the vapour activity of DNOSBP alkanolamine salts applied to a sandy clay loam soil with a pH of 5·5-5·8, without affecting weed control.

23. On the mechanism of sensitivity. Auxin relations of inbred corn [maize] lines. By W. K. Porter, pp. 219-25.

24. Weed control properties of calcium cyanamide. By J. C. Dunn, pp. 227-30. A brief review is given of the chemical behaviour of $CaCN_2$ in soil and of its use as a pre-sowing, pre-emergence and post-emergence herbicide.

25. A comparison of the herbicidal properties of three chlorinated phenoxyethyl compounds : SES, Natrin and Sesin. By R. J. Zedler and J. B. Harry, pp. 231-6.

26. Relative tolerance of cotton to some growth regulator herbicides used for brush control. By C. E. Fisher and others. pp. 268-74. Plant-height reductions, terminal-bud kill and total plant-weight reactions indicated the following order of decreasing tolerance of cotton to 4 herbicides : Silvex 2(2,4,5-trichlorophenoxy) propionic acid, MCPA, 2,4,5-T and 2,4-D.—P.J.B.

1079 California Weed Control Conference. **Proceedings of the 6th Annual Meeting.** 1954, pp. 82.

Papers presented included :

1. Performance of 3-(*p*-chlorophenyl)-1,1-dimethyl urea in the West. By M. C. Swingle and others, pp. 4-7.

2. Dalapon—a new grass killer. By A. W. Swezey, pp. 15-20.

3. Weed control experiments at the Rice Experiment Station at Biggs. By D. C. Finfrock, pp. 26-8. [See Abs. 860.]

4. Winter grass control in sugar-beets. By D. Ririe, pp. 30-2. [See Abs. 914.]—P.J.B.

CROP BOTANY

1080 TORSSELL, B. Några studier över genotypisk och fenotypisk variation hos åkerbruksväxterna och dess betydelse för odlingsvärdet. [**Some studies on genotypic and phenotypic variation in agricultural crops and their agronomic importance.** *Sverig. Utsädesfören. Tidskr.* 1953, **63,** No. 5, 416-39, bibl. 21, English summary pp. 438-9.

1081† DI PRIMA, S. Applicazione di alcuni procedimenti statistico-meteorologici all'ecologia agraria. [**Application of some statistical-meteorological procedures to agricultural ecology.**] *Suppl. Ann. Sper. agr.* 1955, **9,** No. 1, 91-6, bibl. 1, English summary p. 96. [Sta. Agr. Sper., Bari, Italy]

The statistical problem of comparing the yield with a number of meteorological variables is discussed, and several original procedures are indicated.—From English summary.

1082† KREYGER, J. Het bepalen van de dampdrukisothermen van een 9-tal zaadsorten. [**The determination of vapour-pressure isotherms in the seeds of 9 crops.**] *Publ. Droogtechnisch Lab. 39. Cent. Inst. Landbouwk. Onderz., Wageningen* [n.d.], pp. 7, illus. [Received Dec., 1954]

Details are given of an experiment already described in Abs. 329, in which the correspondence between the equilibrium moisture-content of seeds and the relative humidity of the atmosphere at 12-25°C. was determined in the case of rape, sugar-beet, perennial ryegrass, rye, maize, oats, peas, beans and lupins. Data on wheat are not included in this report. A curve (vapour-pressure isotherm) is presented for each seed-type showing the relationship between equilibrium moisture-content (calculated as a percentage of total weight of the seed) and relative humidity. In the tabulated results, figures for equilibrium moisture-content are presented as percentages of the total weight and as percentages of the dry-weight of the seed.—W.J.B.

1083† CHAPMAN, H. W. and others. **The carbon dioxide content of field air.** *Pl. Physiol.* 1954, **29,** No. 6, 500-3, bibl. 25, illus. [Iowa State College, Ames]

The daytime decrease in the CO_2 content of the air among plants carrying on active photosynthesis has been confirmed and shown to extend, with some lag, to a height of 152 m. or 500 ft. A typical fluctuation in the CO_2 content at 152 m. was 0·03% at night, decreasing to 0·027% during the day. With winds of 5 m.p.h. or more the CO_2 content of the air in a corn field sampled at a height of 1 m., was nearly the same as that at the 152 m. level, but on still days and nights a maximum variation of 0·02% has been observed; from 0·041% at night to 0·021% during active photosynthesis. Since the equilibrium CO_2 level at which net photosynthesis becomes zero is in the neighbourhood of 0·01% such marked drops in the CO_2 content of the air may be expected to limit photosynthesis and crop yields. The estimated annual production per acre of CO_2 in Iowa is of the same order as its use in photosynthesis, with decay of organic matter in the soil, or respiration of soil organisms, the dominant factor in CO_2 production. Although daily production may be considerably more or less than use, the 40,000 lb. reserve of the air, plus exchange with other regions by air currents, serves to bring the CO_2 supply in the air a few meters above the soil to near " normal " each night. A deficit of 10% in CO_2 at 150 m. during rapid photosynthesis may represent the gradient across which excess use by plants can be replaced from higher levels of the atmosphere. The rapid fluctuations in the CO_2 content of field air indicate that attempts to measure variations in different growing seasons in the average CO_2 content of the air are subject to large errors and the results difficult to interpret. Similar problems beset attempts to measure long-time changes in average CO_2 concentration.—Authors' discussion and summary.

1084 KOBLET, R. Kulturpflanze und Wasser. [**Crop plants and water.**] *Schweiz. Z. Vermess.* 1954, No. 7, pp. 16, bibl. 16, illus. [ETH Zürich, Switzerland]

This treatise on soil physics and plant growth has particular reference to field crops and is divided under the following headings: the relationships between water and important plant functions; water stored in the soil; soil water and uptake of water by plants; soil-water reserves and plant growth.—D.B.

1085† SCHÜTTE, K. H. **A survey of plant minor element deficiencies in Africa.** *Sols afr.* [n.d.], **3,** No. 2, 285-97, bibl. 21. [Bot. Dep., Cape Town Univ.]

1086 FORSTER, W. A. **Toxic effects of heavy metals on crop plants grown in soil culture.** *Ann. appl. Biol.* 1954, **41,** No. 4, 637-51, bibl. 44. [Long Ashton, Bristol]

A number of pot experiments were made on various crops [oat, rye, barley, sugar-beet and kale], to study the effects on the chemical composition of the plants of treating the soil with cobalt, copper or nickel sulphates, or with the cupric or ferric salts of ethylenediamine-tetra-acetic acid (EDTA). The tops of copper sulphate-treated plants usually contained higher concentrations of copper, manganese, calcium and magnesium and lower concentrations of potassium and phosphorus, than those of control plants. The most marked effect of cobalt on oat was to increase the concentrations

of Ca + Mg in the tops ; nickel had a profound effect on the composition of barley tops. Total iron concentration was reduced in oat by cobalt and copper, and in barley by copper and nickel application. Symptoms of iron deficiency appeared only in the oat plants, their incidence being correlated with the reduction in iron concentration in the tops. The ferric salt of EDTA tended to reduce the incidence of iron deficiency symptoms produced in oat by copper sulphate, but also gave rise to distinct toxic effects. Plants given the cupric salt of EDTA contained unusually large amounts of iron.—Author's summary.

1087† Southern Co-operative Group, USA. **Influence of environment on the chemical composition of plants. 1. A review of the literature.** *Bull. 36. South. Co-op. Ser.* 1954, pp. 198.

Aspects reviewed include the effect of environment on the ascorbic acid, carotene, riboflavin, thiamine, crude fibre, ether extract, Ca, Mg, K, Na, Fe and micronutrient element contents of plants. There are extensive bibliographies after each section of this review.—P.J.B.

1088 Correns, Elisabeth. Über den Aneuringehalt höherer Pflanzen in Abhängigkeit von Tageslänge und Lichtfarbe. [**The aneurin content of higher plants in relation to day-length and colour of the illumination.**] *Biol. Zbl.* 1955, **74,** No. 1/2, 87-105, bibl. 34, illus. [Pflanzenphysiologischen Inst., Univ. Göttingen, W. Germany]

Most short-day, day-neutral (*Helianthus annuus* and *Phaseolus multiflorus*) and long-day plants (*Brassica nigra*) contained more aneurin when grown in short day than in long day. *Sinapis alba* is an exception to the long-day plants in that its youngest leaves contained more aneurin under long day.—D.B.

1089 Scharrer, K. and Preissner, Ruth. Der Vitamin-B_1-Gehalt der Pflanze in Abhängigkeit von ihrer Ernährung. [**The relationship between the vitamin B_1 content of plants and their nutrition.**] *Z. PflErnähr. Dung.* 1954, **67,** No. 2, 166-79, bibl. 17. [Justus Liebig Hochschule, Univ. Giessen, W. Germany]

The influence of fertilizers on the formation of vitamin B_1 in seed of cereals and legumes was studied in pot experiments. The only variable in these experiments was the relative proportion of N, P and K in the fertilizer, each of these being given at 3 levels in combination with constant amounts of the other two fertilizers. Tables show the quantity of fertilizer given and the content and yield of vitamin B_1 in spring-wheat, spring-barley, oats, millet and field peas. The general conclusion is reached that a well balanced complete fertilizer is essential for the formation of vitamin B_1 in plants and that extreme one-sided manuring is as harmful to vitamin B_1 development as lack of manuring. Tests were also made with fertilizers supplying either calcium, chloride, or sulphate ions; variable results were obtained.—D.B.

1090 Bingham, F. T. and others. **Solution-culture studies of nitrite toxicity to plants.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 3, 305-8, bibl. 4, illus. [Univ. California Citrus Exp. Sta., Riverside]

Atlas barley, blackeye beans [*Vigna* sp.] and tomatoes, all rapid-growing species, were grown in a solution-culture apparatus, which is described. Complete nutrient solutions were used, with pH values adjusted to 4, 5, 6, 7 or 8, and supplied with different amounts, up to 100 ppm., of NO_2-N as KNO_2. The plants were placed in the apparatus as seedlings and determinations of growth response taken over a period of 3-4 weeks. The average fresh weights of the shoots of barley, beans and tomato plants grown in culture solutions containing no NO_2-N at pH4 averaged 10, 27 and 52 g., compared with 2·8, 5·2 and 41 g. where 2 ppm. NO_2-N were present ; where no NO_2-N was present and the pH value was 5, average weights were 9·8, 22 and 100 g. and at pH6, 6·4 19 and 106 g., respectively. At pH6, in the case of barley and beans, it took 10-20 times as much nitrite in the culture solution to bring about a growth reduction similar to that obtained at pH4, with less than 2 ppm. of NO_2-N present. It was considered that growth inhibition in the plants was probably due to undissociated HNO_2-N, rather than to the dissociated nitrite fraction, NO_2-N. Though substantial quantities of nitrites have been shown to accumulate only in certain alkaline soils, nitrite toxicity to plants is greatly reduced owing to the effect of the alkaline nature of such soils in favouring the dissociation of nitrous acid. From experiments with tomatoes, it is thought that conditions toxic to plants in the field would occur only where at least 10 ppm. NO_2-N (on a dry-soil basis) were present in the root zone. Such concentrations were thought unlikely to occur in conditions of normal manurial usage, but heavy applications of ammonium-containing or ammonium-forming manures might lead to toxic accumulations of nitrite.—P.J.B.

1091† Marsh, C. A. **Glucuronide metabolism in plants. 2. The isolation of flavone glucosiduronic acids from plants.** *Biochem. J.* 1955, **59,** No. 1, 58-62, bibl. 17, illus. [Rowett Res. Inst., Bucksburn, Aberdeenshire]

" The purpose of this investigation was to isolate baicalin and scutellarin as possible substrates for the enzymes baicalinase and animal tissue β-glucuronidase, and for comparison with other

glucosiduronic acids which might later be isolated from field crops." [See Marsh, C.A. and Levvy, G.A. *Biochem. J.* 1953, **53,** p. 39.]—M.P.

1092† McLean, E. O. and Adams, D. **Further studies involving cationic activities in systems of plant roots.** *Proc. Amer. Soc. Soil Sci.* 1954, **18,** No. 3, 273-5, bibl. 12. [Arkansas Agric. Exp. Sta., Fayetteville]

The activities of cations in homo-ionic and bi-ionic systems of the roots of oats and buckwheat [*Fagopyrum esculentum*] were measured. Data are given of the cation exchange capacities of the roots and the mean free-bonding energies of K and Ca at various degrees of Ca and K saturation of the roots. The findings of these studies are considered in relation to the prediction of the relative uptake of Ca and K by the different crops, for which root exchange capacity, alone, is not considered a reliable index.—P.J.B.

1093† Skripčinskiĭ, V. V. [**Prolongation of life and function in roots of different types of perennial rye and *Agropyron* sp.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **101,** No. 2, 371-3, bibl. 3.

It has been generally recognised that in perennial grasses the fertile stems, together with the roots which belong to them, die off completely after seed ripening. This has been expressed in V R. William's teachings on the ley system of farming but, on the other hand, in Smelov's work " The biological principles of meadow management " (1947) experiments are recorded from which the author concluded that in *Phleum pratense* the roots of fertile stems continue to function after seed ripening, into the following vegetative season. Data from experiments made to elucidate this question during 2 years on cultivated perennial rye (No. 133), wild rye (*Secale anatolicum*) and *Agropyron cristatum* have led the author to conclude that the roots of these plants have the capacity to function and ensure subsequent growth of new stems during summer/autumn to the onset of winter (in the rye plants) and to the spring of the next year (in *Agropyron*). This capacity of the roots is of practical significance (especially in areas subject to long drought) because it enables the new stems to develop from an earlier root system already established in the deeper, moist layers of soil.—M.H.

1094† Čaĭlahjan, M. H. [**Effect of daylength on the character of carbohydrate/protein metabolism in leaves of plants.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **100,** No. 2, 373-6, bibl. 12, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

1095 Schlichting, E. Bemerkungen zur Ausdeutung von Blattanalysen. [**Observation on the interpretation of leaf analyses.**] *Plant and Soil* 1955, **6,** No. 1, 92-6, bibl. 6. [Inst. Pflanzenernähr. Bodenkunde, Univ. Kiel, W. Germany]

Certain problems in the use of leaf analysis data are briefly considered.—P.J.B.

1096† Volodarskiĭ, N. I. [**Theory of phasic development and growth of plants.**] [Russian] *Usp. Sovrem. Biol.* (*Adv. mod. Biol., Moscow*) 1954, **37,** No. 3, 341-57, bibl. 46, illus. [Krasnodar]

Literature on this subject and relevant aspects is reviewed, retrospectively to the works of Sachs (1882) and Klebs (1905).—M.H.

1097 Školjnik, M. Ja. and Steklova, M. M. [**The importance of phosphorus, boron and hydrogen peroxide in relation to the capacity of winter plants to pass the vernalization phase.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **100,** No. 3, 591-4, bibl. 10, illus. [Komarov Bot. Inst., Acad. Sci. USSR]

The significance of mineral substances in relation to the capacity of plants to pass developmental phases has been studied very little, with the exception of the works of Abdolina [*Herb. Abstr.* 8 : 579, 1363 and 1365 ; *Fld Crop Abstr.* 5 : 269]. The authors' soil-culture experiments were made (2 replications) with winter wheat (wheat/*Agropyron* hybrid No. 599), two varieties of winter barley (Swedish and Dagestanskaja) and two varieties of winter rye (Petkus and Manyčskaja). Part of the grain sample used was completely vernalized (45 days in winter at a constant temperature of +1°C.) and part was incompletely vernalized (37 days in water). This incompletely vernalized grain was subjected to vernalization in hydrogen peroxide (10-15 ml. of 4% H_2O_2 per litre [of water]) and in hydrogen peroxide in solution with the following (singly or with 2 compounds in half quantities) in g./l. : calcium phosphate 2·72 ; magnesium sulphate 2, boric acid 0·6. The quantity of water or solution used for vernalization was 37% of the seed weight. From the data obtained, the authors conclude that hydrogen peroxide, boron and phosphorus significantly affect the progress in the plant of the vernalization phase by reducing the number of days which the plants normally require to pass this phase. This is shown, for example, by the fact that on 2 Sept. the number of ears on plants from grain vernalized for 45 days in water was 27 while on plants from grain vernalized for only 37 days in a solution of $H_2O_2 + KH_2PO_4 + H_3BO_3$, the number of ears was 31.—M.H.

1098† Konovalov, I. N. [**Experiments on increas-**

ing frost resistance of stock (*Matthiola* sp.) and of cabbage by treatment with extracts from winter-hardy plants.] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **101,** No. 4, 767-70, bibl. 11, illus. [Komarov Bot. Inst., Acad. Sci. USSR]

In recent years some evidence has accumulated regarding the possibility of changing certain physiological processes (and consequently the productivity) of crops as a result of treating the seed or green organs with a water extract from other plants. In the author's experiments an extract of the leaves of *Bergenia crassifolia* was used. Because of the evidence that the concentration of cellular sap in the leaves of *B. crassifolia* varies in the different seasons, the extract made from 100 g. leaves in 100 ml. water was diluted 4 to 6 times when the experiments were made in spring and 15 to 18 times when made in autumn or winter. The leaves of this species can survive temperatures −30° to −35°C., without damage, and the plant overwinters successfully without a snow cover in Siberia, Soviet Central Asia and northern Mongolia. Under the conditions of the author's experiments there is an indication that the resistance of cabbage (*Brassica oleracea*) to frost can be increased by treating either the seed (soaking in the leaf extract [seed quantities not given] for 24 hours) or the green plant (spraying 1 l. extract per 1 sq. m. leaves) with the extract from *B. crassifolia* leaves. It is claimed that the extract increases the mobility and physiological activity of carbohydrates in the cabbage plants. [See also *Herb. Abstr.* 10 : 1887.]—M.H.

1099† COOKE, A. R. **Changes in free auxin content during the photoinduction of short-day plants.** *Pl. Physiol.* 1954, **29,** No. 5, 440-4, bibl. 16, illus. [Univ. Michigan, Ann Arbor]

1100 HANSEN, B. A. M. **A physiological classification of " shoot auxins" and "root auxins."** *Bot. Notiser* 1954, No. 3, 230-68, bibl. 71, illus. [Bot. Lab., Univ. Lund, Sweden]

Studies are reported on the response of wheat roots, in terms of cell elongation, positive geotropism, lack of tropic response, cell multiplication and phytotoxicity, to 39 growth-regulating compounds, including chlorophenoxy-acetic, -propionic and -butyric acid compounds. A table summarizes the activity of these compounds as reported in the literature and as found in these studies. The morphological effects of these compounds are considered in relation to their structure. Six different theories of the mode of action of growth-regulating substances are discussed. None of the theories quoted is considered to give a satisfactory explanation of all the findings in these experiments. The question of distinguishing between different types of growth-regulatory activity and the concept of auxin and antiauxin are discussed. The concepts of shoot-auxin, in place of auxin, and root-auxin for antiauxin are introduced on the basis of the results of these studies.—P.J.B.

1101 HANSEN, B. A. M. **A physiological classification of " shoot auxins " and " root auxins." 2.** *Bot. Notiser* 1954, No. 3, 318-25, bibl. 36, illus. [Bot. Lab., Univ. Lund, Sweden]

In addition to the compounds studied in the paper alluded to in the previous abstract, ten additional naphthoxy acetic and naphthoxy propionic compounds were investigated in relation to their effect on cell elongation, geotropism, cell multiplication and phytotoxicity in wheat roots. These compounds are classified into shoot auxins, which stimulate cell elongation and multiplication in shoots and inhibit these processes in roots, and root auxins, which stimulate cell elongation and multiplication in roots and which, except for the 1-naphthoxyacetic acids used, can increase the positive geotropism of roots.—P.J.B.

1102† SEN, S. P. and LEOPOLD, A. C. **Paper chromatography of plant growth regulators and allied compounds.** *Physiol. Plant.* 1954, **7,** No. 1, 98-108, bibl. 17. [Purdue Univ. Agric. Exp. Sta., Lafayette, Ind.]

1103† BRIAN, P. W. and others. **The plant-growth-promoting properties of gibberellic acid, a metabolic product of the fungus *Gibberella fujikuroi*.** *J. Sci. Fd Agric.* 1954, **5,** No. 12, 602-12, bibl. 25, illus [I.C.I. Butterwick Res. Lab., Welwyn]

1104† JONES, R. L. and others. **The relationship between the constitution and the effect of chemical compounds on plant growth. 4. Derivatives and analogues of 2-benzoylbenzoic acid. 5. Aromatic nitro-compounds and nitramines. 6. Some derivatives of fluorine.** *J. Sci. Fd Agric.* 1954, **5,** No. 1, 32-47, bibl. 44, illus.

1105† CROWDY, S. H. and PRAMER, D. **Movement of antibiotics in higher plants.** *Chem. and Industr.* 1955, No. 7, 160-2, bibl. 15.

A review is made of present knowledge on the absorption and translocation of antibiotics by higher plants (field crops, garden crops and clover). The presence or absence of various antibiotics in the roots, stems and leaves of plants grown in media to which the antibiotics were applied (in one case an antibiotic was applied to the stem) is tabulated. The varying behaviour of the antibiotics is discussed ; those mentioned are aureomycin (chlortetracycline), chloromycetin (chlor-

mphenicol), gramicidin, griseofulvin, mycetin, eomycin, penicillin, pyocyanin, streptomycin, ubtilin, terramycin (oxytetracycline). The re-iewers point out that readily translocated sub-tances are either neutral or acidic substances chloramphenicol, griseofulvin and penicillin) vhereas anomalous results are reported for the asic (neomycin and streptomycin) and amphoteric aureomycin and terramycin) antibiotics.—W.J.B.

1106 GISIGER, L. and KOHLER, M. Prüfung von Hormothan als wachstums- und ertrags-steigerndem Mittel. [**Testing Hormothan as a means of increasing growth and yields.**] *Landw. Jahrb. Schweiz* 1954, **68,** No. 8, 761-5. [Eidg. Agric. Chem. Anst., Liebefeld-Berne]

n field trials, treatment of winter- and spring-vheat, spring-rye and sugar-beet with Hormothan a phytohormone produced in Italy) did not result n improved germination and early growth or in ncreased yields. A 30% increase in yields had been laimed for this product.—D.B.

1107 AMBERGER, A. and LATZKO, E. Über die Aufnahme des Cyanamids durch oberirdische Pflanzenteile und seine Verweildauer in der Pflanze. [**The intake of cyanamide by the above-ground parts of plants and the length of time it remains in the plant.**] *Z. PflErnähr. Dung.* 1954, **67,** No. 3, 211-19, bibl. 8. [Tech. Hochsch. München- Weihenstephan, Bavaria, Germany]

Pot experiments on oats, mustard and potato have emonstrated that cyanamide solution is absorbed y the above-ground parts of plants. The leaves, owever, die so soon after treatment that the yanamide cannot be completely translocated to ther parts of the plant. Stems are less sensitive nd absorb considerable quantities which are ranslocated downwards. Since cyanamide is eadily absorbed in the N-metabolism of the plant, he length of time it remains as such in the plant aries with factors which influence metabolism, g., light intensity and temperature.—D.B.

1108† HOFMANN, E. and others. Über Aufnahme und fermentativen Abbau von Cyanamid durch höhere Pflanzen. [**On the uptake and enzymatic degradation of cyanamide by higher plants.**] *Z. PflErnähr. Düng.* 1954, **66,** No. 3, 193-202, bibl. 11. [Inst. Agrik-chem. Tech. Hochschule, München]

oya flour, lucerne-leaf and potato-leaf prepara-ons were used. The results confirmed that cyan-mide degradation was enzymatic in nature. The uthors conclude that the enzyme concerned must e widespread in higher plants.—M.P.

1109 LATZKO, E. Zur Biochemie des Cyanamids. [**The bio-chemistry of cyanamide.**] *Landw. Forsch.* 1955, Sonderheft 6, 113-16, bibl. 19.

This paper summarizes the literature on the reaction of the plant to increasing concentrations of cyanamide, the length of time in which cyanamide remains in the plant, and the reactions involved in its decomposition.—D.B.

1110 HOFMANN, E. and LATZKO, E. Anwendung der Radioautographie zum Studium der Aufnahme und der Verteilung von $H_2C^{14}N_2$ durch die Pflanze. [**The use of auto-radiography in the study of the uptake and distribution of $H_2C^{14}N_2$ in plants.**] *Z. PflErnähr. Düng.* 1954, **66,** No. 3, 222-6, bibl. 5, illus. [Inst. Agrik-chem. Tech. Hochschule, München]

Using labelled cyanamide, a study was made of the course of uptake by roots and aerial parts of cultivated monocotyledons and dicotyledons and the subsequent path and distribution in the plants of the cyanamide. Maize, wheat, barley, oats and rye were grown in water culture containing the labelled barium cyanamide. Within 30 min. all parts of the plants possessed the radioactive cyanamide, whether the uptake had been through root, stem or leaves. Uptake through the surface of the stem occurred only if a mucilaginous fungus was present on the stem.—M.P.

1111 PERSIDSKY, D. J. and WILDE, S. A. **The effect of volatile substances released by soil, humus, and composts on the growth of excised roots.** *Pl. Physiol.* 1954, **29,** No. 5, 484-6, bibl. 7, illus. [Wisconsin Agric. Exp. Sta., Madison]

A method is described whereby the effect of volatile substances, emanating from different humus soils, on the longevity and elongation of plant roots can be determined. The upper chamber of a desiccator contained the growing excised roots of the test plant (blue lupin) while the lower chamber contained the soil being tested. It is suggested that the bio-test here described may prove to be of value in the appraisal of the value of different soil treatments.—D.B.

1112 HALL, N. S. and others. **A tracer technique to measure growth and activity of plant root systems.** *Tech. Bull. 101. N. Carolina agric. Exp. Sta.* 1953, pp. 40, bibl. 15, illus.

A description is given of a technique for measuring the distribution and activity of plant roots. The method involves injecting the soil at predetermined points in the root zone with a solution containing P^{32} as a tracer. The distribution and activity of the roots can be assessed by determining the amount of P^{32} taken up from different places in the root zone. This method also permits determination of the time taken for roots to reach given points in the root zone. Examples are given of the use of

this technique in studies on maize, cotton, groundnuts and tobacco. Cotton was the most shallow-rooted crop. At the 11th week after sowing, 60% of the total uptake of P^{32} occurred at the 3-4 in. soil depth, compared with 40% for maize and 25% for groundnuts. At the 8 in. soil depth, groundnuts had the greatest uptake of P^{32} and cotton the least. Maize plants appeared to need a minimum soil area radius of 14-15 in., cotton 6-7 in. and groundnuts 8-9 in., or equivalent calculated plant populations of 9300, 42,000 and 25,000 per ac., respectively.—P.J.B.

1113† Allison, L. E. and Reeve, R. C. **Lysimeters for studying effects of salinity, leaching, and position of water table on plant growth.** *Soil Sci.* 1955, **79,** No. 2, 81-91, bibl. 9, illus. U.S. Salinity Lab., Riverside, Calif.]

1114 Andersson, N. E. and Hertz, C. H. **A new fast recording hygrometer for plant transpiration measurements.** *Physiol. Plant.* 1954, **7,** No. 4, 753-67, bibl. 26, illus. [Physics Dep., Univ. Lund, Sweden]

A description, with circuit and constructional details, is given of an instrument, with a time constant less than 10 sec., for the continuous recording of transpiration from single plants. The instrument makes use of variations in the frequency of streamer corona discharges, as influenced by the humidity of the air in the corona gap. The voltage pulses consequent on the formation of each streamer are fed into a counting-rate meter and recorded. Data are given showing the results of experiments on plants using this apparatus, and methods of using excised plants or plant organs in measurements of transpiration are discussed.—P.J.B.

1115† Bond, T. E. and Kelly, C. F. **The globe thermometer in agricultural research.** *Agric. Engng, St. Joseph, Mich.* 1955, **36,** No. 4 251-5 and 260, bibl. 19, illus. [Agric. Engng Res. Br., U.S. Dep. Agric.]

The results are given of studies on the physica characteristics of the black globe thermometer fo measuring mean radiant temperatures. A chart i given for converting data obtained from 6 in. blac globe thermometer readings to mean radiant tem peratures, where air temperatures and air velocity are also known. The advantages and limitation of the black globe thermometer are reviewed.— P.J.B.

1116† Wurgler, W. and others. Recherches sur la phytotoxicité de l'hexachlorocyclohexane (HCH). [**Researches on the phytotoxicity o hexachlorocyclohexane (HCH).**] *Landw Jahrb. Schweiz* 1954, **68,** No. 9, 975-86 bibl. 10, illus. [Sta. Féd. Essais Agric Lausanne, Switzerland]

HCH, when applied in quantities used for the con trol of insect pests, proved to be toxic during the early growth stages of *Triticum vulgare, Hordeum distichon, Secale cereale, Beta vulgaris, Phaseolus vulgaris* and *Lepidium sativum.* The toxicity was attributed largely to the presence of the γ isomer Lindane. This substance slows down the growth o shoot and root, causes a thickening of the root meristem and, in cereals, a broadening of the coleoptile. The injury is evident at a concentration of 0·3 γ per sq. cm. (0·3 g. per are or 12·1 g. per acre), this being lower than the concentration used when applied as an insecticide. At temperatures above 20°C. the toxicity is increased. The symptoms, always present in greenhouse experiments are less noticeable in the field, but become evident (a) when there is a high temperature at the germination stage, (b) when more than 1000 g. Lindane per acre is sprayed or (c) when it is applied as a seed coating.—D.B.

MISCELLANEOUS

1117† Committee for Colonial Agricultural, Animal Health and Forestry Research. **Ninth Annual Report (1953-1954).** [Contained in] *Colon. Res.* 1953-4, 141-93.

The report provides a concise review of the progress made in the different spheres of colonial agricultural research during 1953-4.—C.L.S.

1118† Jealott's Hill Research Station. **Guide to field experiments 1955.** Bracknell, 1955, pp. 48, illus.

1119 Argentina Ministry of Agriculture. Progreso realizado en las investigaciones agrícolas durante el ano 1953. [**Progress in agricultural investigation in 1953.**] *Idia* 1954 No. 73-5, 1-159, illus.

An outline is given of all agricultural experiment in progress at the various institutes and experiment stations in Argentina in 1953. Publications in 1953 by the members of the various institutes are listed.—W.J.B.

1120† Vandenplas, A. Sur l'organisation de la météorologie agricole en Belgique. [**The organization of agricultural meteorology in Belgium.**] *Rev. Agric., Brux.* 1955, **8,** No. 1 44-55, bibl. 2.

1121† HATAMURA, M. and others. **On the design and analysis of field experiments.** [Japanese] *Bull. nat. Inst. agric. Sci. Ser. A* 1954, No. 3, 1-214, bibl. 23, illus., English summary p. 215.

1122† ZOELLNER, J. A. and KEMPTHORNE, O. **Incomplete block designs with blocks of two plots.** *Res. Bull. 418. Iowa agric. Exp. Sta.* 1954, 171-80, bibl. 9.

1123† BULLETIN TECHNIQUE D'INFORMATION. Production et distribution des semences aux États-Unis et en Grande-Bretagne (Rapports de Mission). [**Seed production and distribution in the USA and Great Britain (Reports of Mission).**] *Bull. tech. Inform.* 1955, No. 97, 75-199, bibl. 45, illus.

1124† BULTOT, F. Saisons et periodes seches et pluvieuses au Congo belge et au Ruanda-Urundi. [**Dry and rainy seasons and periods in the Belgian Congo and Ruanda-Urundi.**] *Comm. 9. Bur. Climatol. INÉAC* 1954, pp. 70, bibl. 15, charts. [Bruxelles]

1125 TENREIRO, F. Bibliografia geográfica da Guiné. [**Bibliography on the geography of Portuguese Guinea.**] *Garcia de Orta, Lisbon* **2,** No. 1, 97-134, bibl. 453.
Works on agriculture and plant distribution are included.—W.J.B.

1126† MCILROY, I. C. **A sensitive temperature and humidity probe.** *Aust. J. agric. Res.* 1955, **6,** No. 1, 196-9, bibl. 2, illus. [C.S.I.R.O., Melbourne]
A description is given of the temperature and humidity probe now in use at several agricultural stations in Australia for the measurement of local variations of temperature and humidity in crops, stored products etc. The portable form, which is self-contained, can be used for taking spot-readings in the field and has its own calibration facilities. There is also a continuously recording form, with a temperature range of 20-140°F.—M.P.

1127 REITH, J. W. S. **Effects of calcic and magnesian liming materials on the calcium and magnesium contents of crops and pasture.** *Emp. J. exp. Agric.* 1954, **22,** No. 88, 305-13, bibl. 12, illus. [Macaulay Inst. Soil Res., Aberdeen]
Magnesian and calcic limestone were each applied at rates of 17·5 - 40 cwt. per ac. in long-term liming experiments in Scotland. The crops used included ; mangels, kale, fodder-beet, turnips, sugar-beet and cereals. Magnesian limestone increased the Mg content of the crops, the increase being greater in the leaves, tops or straw than in the storage parts. The Ca content altered less, increases occurring chiefly after application of ground limestone. The yield increases resulting from liming varied with the crop and the variety used. —M.P.

1128 OLDERSHAW, A. W. **Sugar beet factory carbonate of lime.** *Brit. Sug. Beet Rev.* 1955, **23,** No. 3, 117-21, illus.
In the autumn of 1930 sugar-beet factory carbonate of lime was applied to land on the Tunstall experimental station, Suffolk, at the rate of 7·5 tons per ac. A summary of the cropping results for the succeeding 20 years is given and shows that the beneficial effects of the application were of long duration. Crops grown on the land included : oats, sugar-beet, barley, peas, wheat and linseed, and in every case the yields were higher from the treated than from the control plots.—M.P.

1129† LEASK, D. M. R. and ROWBOTTOM, J. D. **Report on financial results of 183 East of Scotland farms for 1952-53. Part. I. Group 3. 47 stock-raising and feeding farms. Group 4. 78 arable farms. Part 2. Group 5. 58 dairy farms. Part 3. Average prices and returns.** *Bull. 46. Edinb. E. Scot. Coll. Agric. Dep. Econ.* 1954, pp. 68.

1130† PETRIČEVIĆ, J. Neuere Methoden der Produktionskostenberechnung in der Landwirtschaft. [**New methods of calculating production costs in agriculture.**] *Landw. Jahrb. Schweiz* 1955, **69,** No. 2, 145-60. [Schweiz. Bauersekretariat]

1131† RADEMACHER, B. Massnahmen des Pflanzenarztes zum Schutze von Saatgut und Jungpflanzen. [**Measures for the protection of seeds and seedlings.**] *Landw. Forsch.* 1955, Sonderheft 6, 18-27, bibl. 51. [Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]
An account is given of the present position regarding seed-borne disease and the treatment of seeds and young plants with : disinfectants, hot water, antibiotics, ultrasonic waves (with no useful results), fungicides, insecticides, bird-scaring chemicals, micronutrient elements and stimulants. During the past 10 years there has been considerable improvement in methods of killing and repelling animal pests, especially insects, and much success has been obtained with Lindane applied to seed of cereals, legumes, vegetables and beet as a powder containing 20% active substance. This has also proved to be a practical means for combating wire worm. If the treatment is intended to control both fungi and insects, it must be done consecutively, using the fungicide first. Some insecticides (e.g. DDT) may be applied

as an incrustation to seeds. The technical problems connected with the drilling of an insecticide with seed have not yet been satisfactorily solved.—D.B.

1132† WINSLOW, R. D. **Provisional lists of host plants of some root eelworms (*Heterodera* spp.).** *Ann. appl. Biol.* 1954, **41,** 591-605, bibl. 12. [Sch. Agric., Cambridge]

In host-range tests carried out at Cambridge during 1951-3, beet eelworm was found to parasitize nearly all Cruciferae tested. Cabbage eelworm parasitized nearly all Cruciferae tested and a few Labiatae. Hosts of *Galeopsis* and clover eelworms were found amongst the Caryophyllaceae, Labiatae, Leguminosae, Polygonaceae and Scrophulariaceae. Potato eelworm cysts were found only on *Lycopersicum* and *Solanum*. Pea eelworm appeared to parasitize only the genera *Lathyrus*, *Lens*, *Pisum* and *Vicia* (Leguminosae), while hosts of oat eelworm appeared to be distributed more or less at random within the Gramineae.—From author's summary.

1133† JOUBERT, C. J. **The white-fringed beetle. *Graphognathus leucoloma*.** *Fmg in S. Afr.* 1954, **29,** No. 343, 504, and 507.

1134† TOMLINSON, A. R. and others. **Rabbit control with "1080."** *J. Dep. Agric. W. Aust.* 1954, **3,** No. 6, 721-5, illus.

In experiments using "1080", sodium fluoroacetate, in poisoned bait at Manjimup from January to July, 1954, 90-100% rabbit control was obtained. It is a tasteless, odourless and water-soluble substance, which is very deadly but has a slow initial action. Oats and apples can be used as baits since they are quickly rendered harmless, oats on germination and apples on withering in hot sunshine.—M.P.

1135† LEYLAND COLE, L. W. **Endrin.** *World Crops* 1955, **7,** No. 4, 154-8, bibl. 17, illus. [Shell Petroleum Co. Ltd.]

The various applications of Endrin in pest-control are reviewed. Lists are given of insect pests of cotton, rice, maize and grassland successfully controlled in a number of countries by the **use** of Endrin.—W.J.B.

1136 SPINDLER, M. Innertherapeutische Insektizide. Eine Übersicht. [**Systemic insecticides. A review.**] *Z. Pflkrankh.* 1955, **62,** No. 3, 97-165, bibl. 214.

1137 ORDISH, G. **The economics of crop protection.** *Chem. and Industr.* 1955, No. 2, 24-30, bibl. 4, illus. [I.C.I. Ltd., London]

1138 WEBBER, E. R. **Aircraft in agriculture.** *New Commonw.* 1955, **29,** No. 7, 336-8, illus.

A brief, topical account is given of the types of aircraft available for various purposes in agriculture.—W.J.B.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

1139 **Switzerland.** Eidg. Agrikulturchemischen Anstalt Liebefeld-Bern. Bericht über die Tätigkeit 1952 und 1953. [Report of activities of the Federal Agricultural Chemical Research Station, Liebefeld-Bern for 1952 and 1953.] *Landw. Jahrb. Schweiz* 1954, **68,** No. 8, 731-59, bibl. 12.

INVESTIGATIONS REPORTED :

1. Manurial trials, pp. 745-50. These are concerned with the effect of different kinds of phosphate on yields of spring-wheat and potatoes and of potassium manures on potatoes. They are not yet complete.
2. Effect of hail damage on potato yields, pp. 750-1. The question of whether to harvest the crop as soon as possible after a summer hail storm, or to leave it in the ground for regrowth of tops to take place, was investigated. Although after hail damage (in July) leaves dropped off and stems were injured, fresh growth took place and new tubers were formed in those plants which were left in the ground for a further month. Their yield of tubers was about 14% higher than those harvested soon after damage.
3. Tests with rape, pp. 752-3. These included varietal and time-of-harvesting trials.
4. Trials with sugar-beet, pp. 753-4, included : an investigation of the best conditions for sowing monogerm seed ; singling experiments ; and the effect of additions of manganese sulphate to manganese-deficient crops.
5. Control of weeds and insect pests, pp. 755-8.—D.B.

1140 **Switzerland.** Stations Fédérales d'Essais Agricoles, Lausanne. Rapport d'Activité 1953. [**Report of activities for 1953.**] *Landw. Jahrb. Schweiz* 1954, **68,** No. 9, 775-913, bibl., illus.

INVESTIGATIONS REPORTED :

1. Potato trials, pp. 829-32. The object is to

obtain varieties rich in starch, suitable for the manufacture of potato flakes.
2. Effect of date of sowing and population density on yield of green-maize, p. 839. The experiments confirmed the advantages of early sowing (mid-April) and a medium population density [70,000-90,000 plants per ha.].
3. Phosphorus manuring of oats (pot experiments) pp. 842-3. Of the types of phosphate used, superphosphate gave the best results, whether the oats were grown in acid, neutral or alkaline soils.
4. Resistance to frost and snow cover, p. 844. Among winter-wheats, Austro-Bankut, Dehrenburger Silber and Reliance proved to be frost resistant and Carsten V and Carsten VI resistant to snow cover. Among the winter barleys tested, G.32 and G.51 were outstanding in their winter-hardiness.—D.B.

1141 **Canada.** Manitoba Department of Agriculture. Annual Conference of Manitoba Agronomists, 1953. 1954, pp. 63.
The following were among the reports given.
1. Summary of results with common wheat varieties in Manitoba, pp. 1-2. In co-operative tests at 5 locations over a 7-year period, mean yields of Redman, Thatcher, and Lee were 40, 40·7 and 42·6 bu. per ac. ; 2-year averages for Redman, Thatcher, Lee and R.L. 2769 were 43·1, 43, 44·6 and 49·2 bu. per ac., respectively. In supplementary tests, C.T.186 (Selkirk) outyielded Lee, Regent, Redman and Thatcher.
2. Summary of results with durum wheat varieties in Manitoba, p. 3. In tests at 5 locations over a 10-year period, Mindum and Stewart 221 gave mean yields of 37·6 and 39·6 bu. per ac., respectively. In 1953 trials, R.L. 3208 gave the highest yield, 44·8 bu. per ac., followed by R.L. 3207 (42·3 bu.) and Ld. 308 × Nugget (40·2 bu.). Nugget yielded 29·4 bu. per ac.
3. Co-operative oat tests, pp. 5-6. In trials in 1951-3 at 6 locations, highest mean yields were given by Abegweit, with 95·9 bu. per ac., followed by Rodney 95·3 bu., Exeter 94·4 bu., Garry (new selection) 91 bu., Victory 89·4 bu. and Ajax 87·9 bu. per ac. Yields in 1953 were headed by Rodney, Ajax and Abegweit.
4. Co-operative barley tests. Yields during the 3-year period 1951-3 at 4 locations in Manitoba were headed by Husky, with an average of 74·2 bu. per ac., followed by Br. 1259-597 70·1 bu., Vantage 69 bu., Montcalm 64·9 bu. and OAC. 21 60·3 bu. per ac. In regional tests at 6 locations in 1953, 48-570 gave the highest yield, 52·1 bu. per ac., followed by 48-584, with 49·2 bu. per ac. Husky, Montcalm and Vantage yielded 47·7, 43·8 and 41·1 bu. per ac., respectively. A note is given on Gateway, a new 6-rowed, smooth-awned feeding barley for N. Alberta and the Peace River area.
5. Co-operative flax [linseed] tests, pp. 11-12. 5-year yield averages at 3 locations in Manitoba were headed by Redwood, C.I. 1155, Rocket and C.I. 1176, with 27·4, 25·3, 25 and 24·5 bu. per ac. In tests in 1953 at 5 locations, Redwood yielded 26·6 bu. per ac., followed by Raja with 24·7 bu. and C.I. 1155 with 23·8 bu. per ac.
6. Soyabean yield trials—1953. In trials over 4 years at 3 locations, yields of Acme, Kabott and Flambeau averaged 21·7, 25·3 and 30·7 bu. per ac., respectively. In sowing-date trials, yields following sowing on 16 and 26 May were similar and were significantly higher than where sowings were made on 6 May or 8 June. In spacing trials, the varieties Acme and Flambeau produced progressively higher yields as row spacing decreased from 36 to 18 in., the responses being greater for Acme (a small and early variety) than for Flambeau.
7. Length of storage period between treatment and sowing required by cereal seed treated with modern fungicides, pp. 19-20.
8. The effect of honey bees on sunflower pollination, p. 33.
9. The reaction of linseed and wheat to various concentrations of wild mustard plants and to their removal with 2,4-D, p.36. [See Abs. 221.]
10. Chemical control of weeds in field peas, p. 37. Applications of not more than 4 lb. TCA per ac., made when green foxtail [*Setaria viridis*] seedlings were not over 2 in. high, gave good control of this weed with no damage to the pea crop.
11. The performance of potato varieties in Manitoba in 1953, pp. 53-4. In early potato trials at 3 locations, highest yields of marketable tubers were given by Warba, Manota, Irish Cobbler and Osseo, with 276, 269, 268 and 236 bu. per ac., respectively. In main-crop trials at 5 locations, highest yields were given by S109, Pontiac, Manota and Irish Cobbler, with 364, 296, 285 and 274 bu. per ac. and starch contents of 17·9, 13·9, 15·7 and 16%, respectively.
12. Experimental work with sugar-beet, p. 56. In agronomic evaluation trials with 16 varieties, the Kleinwanzleben variety of the E and N type was superior. In the second year of tests, 5-6 lb. of TCA per ac. applied as a pre-emergence treatment, and pre-sowing treatments of 5-6 lb. IPC, incorporated in the soil to a depth of 2-4 in., again gave good control of *Setaria viridis* and wild oats, respectively.—P.J.B.

1142 **United States** Department of Agriculture. Report on the Agricultural Experiment Stations 1953. 1954, pp. 177.
INVESTIGATIONS REPORTED .
1. Movement of growth regulators, p. 61. Trials in Maryland showed that boron and sugars markedly enhanced the activity of 2,4-D in the leaves of bean plants.

2. New maize hybrids, p. 70.
3. Nitrogen for continuous maize cropping, p. 74. In trials in Ohio, ploughing under 100 lb. N per ac. maintained yields at 70 bu. per ac. after 7-9 successive crops. Low-grade organic matter + N was often equal in value to a leguminous sod with a high N content, when ploughed under for maize.
4. Row-spacing for sorghum, p. 76. Trials in Kansas showed that sorghum grown in rows 21 in. apart gave as great, or greater, yields than that grown in rows 42 in. apart.
5. Production of cotton for mechanical harvesting, pp. 76-7. Where mechanical harvesting was used, highest yields were obtained where plant populations of 20 thousand to 60 thousand per ac. were used. High plant-populations helped to offset the tendency of machine harvesters to miss bolls growing near ground level.
6. Effect of 2,4-D on skin colour and other characters of potatoes, p. 79. Treatment of potatoes just before harvest with small amounts of 2,4-D Na salt increased the content of protein and vitamin C and intensified the red colour of Red McClure tubers.
7. Ethylene chlorhydrin for sprouting sweet-potatoes [*Ipomoea batatas*], p. 80. In trials with a number of new sweet-potato varieties which are difficult to induce to sprout, ethylene chlorhydrin was more effective than any other treatment, including chemical and heat treatments, for inducing sprouting.
8. Disease resistance in plants, p. 94. A variety of potato (Triumph) susceptible to ring rot [*Corynebacterium sepedonicum*] had relatively high contents of proline and very low contents of asparagine in the plant stems, while the opposite was the case with highly resistant varieties. Higher contents of chlorogenic acid in the skin of potatoes appeared to be associated with resistance to scab [*Actinomyces scabies*].—P.J.B.

1143 **Florida** Agricultural Experiment Station. Annual Report for the fiscal year ending June 30, 1953. [n.d.], pp. 354.

INVESTIGATIONS REPORTED :

Main Station.

1. Determination of optimum air delivery, air temperature and depth of seed for mechanical drying of groundnuts. By J. M. Myers and F. Rogers, p. 39. [See *Fld Crop Abstr.* 7 : 492.]
2. Groundnut improvement. By W. A. Carver and others, p. 44. A new variety, Florispan Runner, was released in 1953. This variety was produced from a Small White Spanish × Dixie Giant cross and has predominantly Spanish-type pod- and seed-characters and a trailing habit. In trials in 1952, Florispan Runner gave 43% higher yields than common trailing groundnuts.
3. Variety tests with field crops. By W. A. Carver and others, pp. 44-5. Highest yields of Group VII soyabeans in 1952 were given by Roanoke, N47-3479 and D49-772 and in Group VIII by Mamotan 6640, Mamotan 6680 and Woods Yellow No. 1. Of cowpea [*Vigna sinensis*] varieties considered best for combine harvesting, Dixielee, Blue Goose, Paraguay No. 1, Chinese Red and Calhoun Crowder gave the highest yields.
4. Improvement of oats. By D. D. Morey, pp. 49-51. [See Abs. 801.]
5. Nutrition and physiology of the groundnut. By R. W. Bledsoe and others, p. 51.
6. Improvement of potato cultural practices. By E. N. McCubbin, p. 157.

Everglades Station:

7. Agronomic investigations with fibre crops. By C. C. Seale and others, pp. 235-7. In trials on Everglades peat soil, the jute variety *Corchorus capsularis* (P.I. 187292) gave the highest fresh weight and fibre yields. *C. olitorius* (P.I. 167091) did not appear to be adapted to S. Florida.
8. Pre- and post- emergence weed control in sweet-corn. By V. L. Guzman and E. A. Wolf, pp. 249-54. [See Abs. 844.]
9. An evaluation of 2,4-D contamination to untreated sensitive plants. By V. L. Guzman. Observations are made on the drift and volatility of the butoxy ethanol ester and dimethylamine salt of 2,4-D in the field.—P.J.B.

1144 **Mexico.** Campo Experimental Agricola Santa Elena. Informe No. 1, 1952-1954. [Publication No. 1, 1952-4.] Toluca, 1954, pp. 59, illus.

INVESTIGATIONS REPORTED :

1. Maize variety trials, pp. 13-19. Local varieties of maize in the Toluca Valley were outyielded by the hybrids H-123 and H-124, and, in other trials, by a locally-bred variety Mex. 110. In a trial of varieties suitable for the Mexico Valley, at Chalco, a newly developed hybrid [not named, but parent plants mentioned] yielded 9·89 m. tons of grain per ha., outyielding Rocamex H.1 (9·3 m. ton per ha.) and markedly outyielding a local variety, Chalco, which yielded 6·87 m. ton per ha.
2. Resistance of wheat varieties to rusts, pp. 21-4. Two new wheat varieties, Lerma Rojo and Majo 54 are resistant to *Puccinia graminis*. The new variety Yaqui 53 is resistant to *P. glumarum*.
3. Potato variety trials, pp. 27-34. Of the 30 varieties grown, Alpha, Furore, Bintje, Up-to-date, Majestic and Gineke were outstanding for quality and yield.—W.J.B.

1145 **Costa Rica.** Inter-American Institute of Agricultural Sciences. Annual Report for 1952. Turrialba, 1953, pp. 163. [Received Sept., 1954]

INVESTIGATIONS REPORTED :

1. Potato improvement. By E. H. Casseres p. 23.

Two varieties which were resistant to *Phytophthora infestans*, Kennebec and Dua-2, outyielded local varieties. Dua-2 gave a yield of 437 bu. per ac. in one trial, 3 times that of the main local variety, Morada Blanca.

2. Control of sweet-potato weevil. By E. Viale and N. F. Thomas, pp. 24-5. Dieldrin emulsion, Aldrin emulsion, Lindane water suspension and Chlordane wettable powder, applied to soils infested with sweet-potato weevil, gave sweet-potato yields 579, 449, 310 and 206% greater than from untreated controls.

3. Control of lodging in maize caused by corn root-worm (*Diabrotica balteata*). By E. Viale and J. R. Havis, pp. 26-7. Toxaphene, Dieldrin and Aldrin, as pre-emergence treatments, all gave control of *D. balteata* and increased yields. The highest yields of maize (210% greater than from untreated plots) were obtained by applying Toxaphene, as an emulsion, at the rate of 500 mg. active material per hill.

4. Control of *Helminthosporium oryzae* in rice. By L. H. Gutiérrez, pp. 27-8. Treatment of rice seed with Granosan at the rate of 1·14 oz. per 100 lb. seed gave an increase (compared with no treatment) of 41% in rice yields.

5. Map of agricultural regions of Costa Rica. By A. W. Peterson and others, p. 132. The map has been completed and published.—W.J.B.

1146 **Trinidad and Tobago** Department of Agriculture. Administration Report of the Director of Agriculture for the year 1953. Trinidad, 1954, pp. 70. [Received March, 1955]

INVESTIGATIONS REPORTED :

1. Rice variety trials, pp. 33 and 65. The yields from the varieties D54/42 and Sorro, 2359 lb. and 2316 lb. per ac., respectively, were significantly below those from the varieties Bengawar, D.52/37 and D.85/42. In another trial, the American-bred varieties Blue Bonnet, Fortuna and Rexoro, imported from Surinam, yielded less than 971 lb. per ac., whereas the local varieties Bolo and Sughani yielded 2975 lb. and 2696 lb. per ac., respectively.

2. Cover crops, p. 34. Introductions showing promise are *Desmodium gyroides* and a thornless variety of *Mimosa invisa*.

3. Soil conservation run-off plots, pp. 35 and 65. The percentage run-off was high from bare fallows (21 and 17%), but only 1·5% from maize and peas, and 2% from a bush fallow.—M.P.

1147 **Algeria.** Gouvernement Général, Inspection Générale de l'Agriculture. Rapport du Conseil de l'Expérimentation et des Recherches Agronomiques pour 1953. [Report of the Council for Agronomic Experimentation and Research for 1953.] Alger, 1954, pp. 366. [Received March, 1955]

INVESTIGATIONS REPORTED :

1. Salty soils, pp. 44-8. Rice crops were satisfactory when manured with N fertilizers, yielding on an average 2600 kg. per ha.

2. Durum wheats, pp. 55-67. The varieties Palestine 21·150 and Zenati 368 were resistant to yellow berry. Of the early varieties under trial Palestine 21·150 was best.

3. Soft wheat, pp. 68-78. Two varieties of Pusa × Mentana yielded best at the Station de Maison-Carrée.

4. Barley, pp. 82-8. The variety Tichedrett yielded best at Maison-Carrée.

5. Legumes, pp. 89-98. The bean [*Vicia faba*] varieties Sidi-Moussa, Aquadulce, Guelma and Aquitaine proved to be early and high-yielding. The chick-pea [*Cicer arietinum*] varieties Garbenzo, Souf et Tell and 462/E.28 were best.

6. Sugar-beet, pp. 170-5. In varietal trials under irrigation, Bataille and Klein Wanzleben E yielded best with 6920 and 6890 kg. of sugar per ha., respectively. In trials of sowing date and plant density, the earliest sowing, 25 November, at the spacing of 0·80 × 0·25 cm., gave the highest sugar yield, 5910 kg. per ha., which was considerably more than from later sowings. The percentage of bolting, however, was highest with the earliest sowing. Decreasing the plant spacing to 0·80 × 0·15 cm. did not improve yields with the later sowings.—E.B.O.

1148 **South Africa** Department of Agriculture. Annual Report of the Secretary for Agriculture for the year ended 31 August, 1953. Crops and pastures. By H. W. Turpin. *Fmg in S. Afr.* 1954, **29**, No. 334, 38-41.

INVESTIGATIONS REPORTED :

1. Maize, p. 38. Research on the role of the various factors concerned in the use and dissipation of rainfall by the maize crop was conducted at the Rietvlei Research Station. Control of some of the moisture normally lost by evaporation effected a 60% increase in grain yield. Control of competitive weed growth doubled yield on unfertilized land and trebled it on fertilized. Subsoil aeration and the distribution of fertilizer in a vertical plane were done in order to make available to the crop those moisture reserves which are held in the soil below the normal root zone, and gave promising results. This hydrological aspect of climatological research is to be expanded considerably.

2. Cotton, p. 40. Research is centred at the Barberton Agricultural Research Station, but variety trials are conducted at other centres. None of the imported varieties, including Egyptian varieties (*Gossypium barbadense*) from the Sudan, yielded as well as locally-bred strains. Cotton-breeding at Barberton is mainly concentrated on

the Muka (M.V.8 × B.P. 52) strains which give consistently good results over a wide range of seasons. Breeding for resistance to *Xanthomonas malvacearum* (bacterial blight) continues.

3. In cotton pest control experiments it was demonstrated that both DDT and Toxaphene were effective in controlling American bollworm (*Heliothis armigera*), applications early in February giving the best results.

4. Cotton cultural experiments, pp. 40-1. The highest yields were obtained where compost and seven-eighths of the fertilizer (superphosphate and potassium chloride) were placed in the plough furrow at 3 ft. intervals, the rest of the fertilizer being applied as a top-dressing in the row at planting. In comparing pre-planting tillage methods, better yields of both maize and cotton resulted from ploughing than from deep cultivation with a heavy tiller, but the latter process was superior to subsoiling at 3 ft. intervals.—G.M.R.

1149 **South Africa.** Vaalhartz Agricultural Station. Agronomy experiments 1946-50. By W. van der Merwe and others. *Sci. Bull. 350. Dep. Agric. S. Afr.* 1953, pp. 70, illus. [Received June, 1954]

INVESTIGATIONS REPORTED :

1. Rotation and cultivation experiments, pp. 11-14. Eelworm infestation of potato tubers and plants was highest in the 3-year summer-crop rotation of potatoes/maize/sunnhemp and lowest in the 2-year summer-crop rotation of potatoes/sunnhemp. The potato yields from the different rotations did not vary significantly, but were less than those obtained after cultivation treatments. Wheat was sown in all rotations as a winter crop, and significantly high yields were always obtained when sunnhemp had been the preceding crop.

2. Variety trials of crops grown under different conditions, pp. 15-36. The winter crops were wheat, oats, barley and rye ; the summer crops were groundnuts and potatoes. The conclusions to be drawn from each year's results are discussed separately. In the course of the trial 25 wheat varieties, 13 oat varieties and 9 barley varieties were sown on different dates and the yields recorded ; the results from wheat and oats showed that yields varied with the date of sowing and the year, but all the barley varieties reacted similarly to both dates of sowing. The P and Ca contents of 16 wheat varieties were determined. Witklein and Punjab had the highest P content and gave the highest yields. In rye varietal trials Abruzzi was inferior to the other 4 varieties.

3. Utilization of sunnhemp, pp. 37-44. Rotation and fertilizer treatments were studied to determine the value of sunnhemp on light sandy soils and the most economic use of this crop. The sunnhemp was sown and ploughed in at different times, oats, maize, wheat and Sudan grass being used as test-crops. Beneficial effects were most noticeable in the first test-crop after ploughing in sunnhemp. A nitrogen response was apparent, higher crop-yields being obtained in the first year after application of mineral fertilizers and in the second year after compost had been applied. The different treatments had no significant effects on the third test-crop of the rotation owing to the depletion of N.

4. Shortening of the rest period of potatoes, pp. 42-7. Various methods of storage as well as mechanical and/or chemical treatments were employed. The pulling of tops before the plants had reached a certain degree of maturity resulted in faster germination but this was offset by the greater rotting of the tubers under storage. Untreated whole tubers germinated last and though they had the highest final stand count they gave very low yields. Highest yields were obtained from all treatments showing 50% germination 26 days after planting. Ethylene chlorohydrin together with Aretan, applied to cut tubers 2 weeks before planting, shortened the rest period of potatoes and resulted in good germination, but increased the tendency to rot under storage.

5. Organic material—eelworm experiment, pp. 47-9. The application of straw at different stages of decomposition showed that the lowest infection of eelworm occurred in treatments where the organic content of the soil was high, e.g. when 60 tons of raw compost and 20 or 60 tons of staw had been added.

6. Slope experiment, pp. 53-62. The relationship between the amount of water applied to irrigated plots and their differences in slope, length and width was studied. The crops grown were oats, maize, wheat and groundnuts. The water requirements of the crops were higher with longer plots and where the slope was least. Interactions were noticeable between all factors, excepting length and width.—M.P.

1150 **India.** Institute of Plant Industry, Indore, Madhya Bharat. Progress Report for the year ending 31 May, 1954. Indore, 1954, pp. 61.

INVESTIGATIONS REPORTED :

1. Eradication of kans grass, p. 8. Harrowing land with a blade harrow (bakhar) at intervals of 7 days from November to June gave good control of kans grass (*Saccharum spontaneum*).

2. Grafting of Egyptian cotton on native *G. arboreum* stocks, p. 19. The fibre characters of cotton produced by grafting Egyptian *G. barbadense* (variety Karnak) on native *G. arboreum* varieties compared favourably with those of imported Karnak cotton.

3. Comparative trials with perennial cotton varieties, p. 20. One year after planting, the perennial variety Bourbon Fuzzy (*G. hirsutum* var.

punctatum) gave the highest yield of seed cotton (123 g. per bush).
4. Groundnut varietal trial, p. 22. Of the numerous varieties tested, A.H. 218 gave the highest yield of oil (423 lb. per ac.).
5. Linseed varietal trial, p. 23. The Institute selection, I.P.I.S.5 outyielded other varieties.
6. Grain sorghum varietal trials, p. 23. Fifteen of the varieties tested outyielded the control variety, I.P.3. Sanwer 1 Yellow Medium gave the highest yield (940 lb. per ac.).
7. Soaking of cotton seeds in nutrient solutions, pp. 27-8. No increases in yields of cotton were obtained by pre-soaking seed with ammonium phosphate and ammonium sulphate solutions.
8. Green manuring of wheat, pp. 33-4. Of the numerous green manures tested, sunnhemp [*Crotalaria juncea*] gave the highest yield of wheat grain, but none of the green manures gave a significant increase compared with the control (on green manure).
9. Manurial trials with irrigated and unirrigated wheat, pp. 34-5. The application of 30 lb. N per ac. increased the grain yield of irrigated, but not of unirrigated, wheat.—W.J.B.

1151† **New Zealand.** Department of Census and Statistics. Official yearbook 1954. 59th issue. Wellington, 1954, pp. 1161.

[See also *Herb. Abstr.* 24 : 617.] The land under crops on 31 Jan., 1953 has been classified according to condition and use (pp. 396-7) ; there is also a classification of holdings according to farm type (pp. 458-9), and information on the principal field crops (pp. 467-8), grain and seed crop yields (p. 468), grass seed acreages (p. 474), areas under artificially sown grass, tussock and other naturally established native grasses (p. 474).—M.H.

BOOKS

1152 GADEA, M. Trigos españoles. [**Spanish wheats.**] 1954, pp. 450, bibl. 20, illus., Madrid ; Inst. Nac. Invest. Agron., 24·5 × 18 cm.

A detailed description is given of the Spanish wheats, with notes on the morphology, agronomic characteristics and geographical distribution of each. The various cultivated types are classified into groups of species as follows : *Triticum vulgare*, *T. compactum*, *T. durum*, *T. turgidum*, *T. polonicum*, *T. dicoccum*, *T. monococcum*, *T. spelta*. Each group of species is again sub-divided into groups of botanical varieties which contain the various cultivated types. There are introductory chapters on taxonomic characters of wheat and the classification of the genus *Triticum*. A list of the cultivated types of wheat grown in each Spanish province is appended, together with an excellent index of popular and botanical names.—W. J. Baulkwill.

1153 BAHTEEV, F. H. [**Problems of ecology, phylogeny and breeding of barley (*Hordeum* L. sectio *Crithe* Döll).**] [Russian] 1953, pp. 218, bibl. 270, illus., Moscow-Leningrad ; Komarov Bot. Inst., Acad. Sci. USSR, 22 × 15 cm., 10 roubles 80 kopeks. [Received Jan., 1955]

This work, comprising a part of the results of ecological/geographical research on crop plants begun by the All-Union Institute of Plant Industry, includes the results of experimental work on barley during the period 1933-40. The work includes descriptions of 31 agro-ecological barley groups (proles), with notes, under the following headings, on the characteristics of the plants : morphological features, centre of origin, taxonomy, vegetative period, reaction to vernalization, photoperiod, habit, ear and grain characters, drought resistance, reaction to high and low temperature, susceptibility to diseases and pests.—M. Hall.

1154 RAMIAH, K. **Rice breeding and genetics.** 1953, pp. 360, bibl. 500, illus., New Delhi ; Indian Council of Agricultural Research, 24 × 18 cm., Rs. 17 As. 8 or 27s.

Although primarily a study of rice genetics, this book will be of considerable interest to all who are interested in problems connected with rice-growing in India. The following sections of the book will be of special interest to the non-geneticist ; (a) Part I and II (pp. 1-96) in which the general botany, taxonomy and classification of rice are dealt with ; (b) Chapter 10 (pp. 44-8), entitled " Rice growing conditions and practical results of breeding in India " in which the practical results obtained at the various rice-breeding stations in India are discussed ; (c) Chapter 11, (pp. 96-103), entitled " Organization of seed supply " ; (d) Chapter 14, Section 13 (pp. 215-23) " Diseases of rice and breeding for disease resistance " ; (e) Chapter 19, Section 1 (p. 273) " Agronomic factors affecting quality " ; (f) Chapter 20 (pp. 284-93) " Problem of rice yield in India."—W. J. Baulkwill.

1155 FISCHNICH, O. and HÖPPNER, Elisabeth. Bestimmungs-schlüssel für Kartoffelsorten an Lichtkeim und Knolle. [**Key for the determination of potato varieties by means of the light sprouts and the tubers.**] 1954, pp. 46 + append., bibl. 28, illus., Hildesheim ; Verlag Th. Mann K.G., 21 × 15 cm., 28·50 DM. [Received March, 1955]

For many years potato varieties have been identified by the characteristics of their light sprouts, but owing to the long period of dormancy, the method is a slow one. The authors have developed a rapid method, based on the breaking of dormancy by chemical means. Rindite, the chemical used, has a further diagnostic value in that tubers, treated in the dark, develop, when placed in light, a colouring of sprout and tuber which is characteristic of a variety. This coloration can be used as a primary classification of varieties. The whole process of identification can be completed within a few days at any time of the year. The procedure is clearly described, varieties are classified, and a key is provided for identification. The next section of the book consists of an alphabetical arrangement of varieties. Allowing one page for each, this section gives a photograph of part of the tuber and sprout, notes on the tuber, and a description of the sprout before and after light treatment. Finally there are 5 plates which reproduce the colouring resulting from treatment by Rindite in over 70 varieties from the German collection.

There is no ambiguity here. A diagrammatic glossary leaves no doubt of the meaning of terms, and all abbreviations are explained. Everything has been done to facilitate reference, even to a thumb index for the alphabetically arranged material. The style of the book is unusual ; it is produced as a loose-leaf note-book with gaps in the paging to allow for the insertion of new material.—D. Brown.

1156 Panse, V. G. **Manuring of cotton in India.** Revised 2nd edn, 1953, pp. 80, bibl. 26, illus., Bombay ; Indian Cent. Cott. Cttee, Rs. 5. [Received Feb., 1955]

This is a revised edition of a review of experimental work on the manuring of cotton, first published in 1945. The review now includes experiments up to 1948. The manuring of both rain-fed and irrigated cotton is dealt with. There is a special chapter on nitrogenous manuring.—W. J. Baulkwill.

1157† Forsyth, A. A. **British poisonous plants.** *Bull. 161. England and Wales Minist. Agric. Fish.* 1955, pp. vi + 116, bibl. in text, illus., London ; H.M. Stationery Office, 35 × 15 cm., 6s. 6d.

Losses and illness of farm stock by plant poisoning continue to engage the attention of farmers and veterinarians. Early identification of poisonous plants grown on, or near, the farm is, therefore, the first step in their eradication before they cause trouble, either in pasture or when inadvertently mown and conserved with hay or dried grass. The author of this bulletin, formerly Principal and Professor of Veterinary Surgery at Glasgow University, and now Veterinary Consultant to F.A.O., clearly describes in simple language the many poisonous plants found in Britain, the symptoms of illness which they cause, and the first-aid treatment and remedies which can be adopted. Since poisoning cases also occur in man, especially in children, through eating parts of poisonous plants, the opportunity has been taken to deal with this aspect also.

1158† Kotov, M. I. [**Flora of the Ukraine, Vol. 4.**] [Russian] 1952, pp. 691, illus., Kiev ; Acad. Sci., Ukrainian RSR, 26 × 17 cm., 38 roubles. [Received December, 1954]

1159 Scharrer, K. Biochemie der Spurenelemente. [**Biochemistry of the trace elements.**] 1955, pp. 412, bibl. about 2000, illus. coloured, West Berlin ; Paul Parey, 23 × 15 cm., DM. 39, 60.

1160† Tukey, H. B. (Ed.) **Plant regulators in agriculture.** 1954, pp. x + 269, bibl. at end of each chapter, illus., New York ; John Wiley and Sons, Inc., London ; Chapman and Hall, Ltd., 24 × 15 cm., 44s.

This is a book on plant regulators, with a difference, for it is neither a treatise for specialists nor a collection of recipes. The editor and his collaborators set themselves the task of explaining to agricultural officers, students, and others less well-grounded in science, the nature of these highly active substances, their mode of action and range of application. After introductory chapters on elementary botany and chemistry, successive authors go on to describe the more important aspects of root production by shoots, abscission, fruit setting, parthenocarpy, and other physiological processes which can be influenced by plant regulators. In addition there are chapters on such topics as weed control, inhibition of sprouting, and spraying techniques.

A book of this size cannot claim to cover the field completely, and it would be easy to point to omissions. By and large, the authors have made a wise choice and have not strayed too far from accuracy in their endeavour to condense the material. It is perhaps difficult to see how the uninitiated reader could hope to graduate from such simple statements as " Many tiny cells make up the plant body " or " The element carbon is said to have a combining power of four " in the introductory chapters to the complexities of undissociated 2,4-D molecules described in later sections; but a more gradual transition might well have doubled the size of the book, and its price.

With one single exception, all contributors to this volume work in the U.S.A. and they have drawn on American references to a large extent. However, because of its emphasis on basic facts

this book should be of value to workers in all parts of the world. It will provide interesting reading for a large number of people, particularly those who are making use of the powers of plant regulators without understanding their basic scientific properties.—R. H. M. Langer.

1161† AVERY, B. W. **The soils of the Glastonbury district of Somerset.** *Sheet 296. Mem. Soil Survey Gt Britain* 1955, pp. 135, bibl. 35, illus., 1 map, London ; Minist. Agric. Fish., 24 × 15 cm., 15s.

This survey, which had its origin in a study of the teart pastures, brings out the reasons for the different types of farming practised in the area. The District is introduced with an account of its relief, geology, climate, drainage and vegetation, and this account goes back, in some instances, to pre-Roman times. The major part of the book is devoted to soil mapping and classification and to an account of soils of the brown earth, calcareous, gley and organic groups. In the final chapter, on agriculture and land use, the history of land cultivation in this district is traced from the pre-Christian era to the present day. There are two distinct agricultural areas. (a) The north-eastern, traditionally cheese-making region on heavy-textured, often poorly drained soils, is devoted almost entirely to dairying. Here the grasslands are chiefly agrostis/ryegrass pastures which vary widely in botanical composition and productivity as a result of differences in management. (b) The south-western region is one of mixed arable and dairy farming which is conditioned by drier climate and more porous soils than in the north-east. The grassland on the moors provides summer grazing. There are no traditional rotations ; these are governed by market prices and stock requirements. Cereals occupy 80% of the arable acreage ; root crops and greens are grown for cash and for fodder. An unusual crop is fuller's teasel (*Dipsacus fullonum*) formerly widely grown in Somerset. A brief account is given of the "teart" pastures and the "snake-pipe land." A 4-page glossary concludes the memoir. There is no index.—D. Brown.

1162† PAPADAKIS, J. Mapa ecológico de la República Argentina. 1. Texto. [**Ecological map of Argentina. Part 1. Text.**] 2nd edn (enlarged), 1952, pp. 231, illus., Buenos Aires ; Minist. Agric., 26 × 18 cm.

This publication is a detailed interpretation of the data presented in Part 2 (see below) which consists of maps only. Apart from a discussion of the ecology and distribution of numerous cultivated plants, including wheat, linseed, maize, cotton, groundnut, sunflower, potato and lucerne, there are sections dealing with the climatic divisions, the natural vegetation and the forage and grassland resources of Argentina.—W. J. Baulkwill.

1163† PAPADAKIS, J. Mapa ecológico de la República Argentina. 2. Atlas. [**Ecological map of Argentina. Part 2. Maps.**] 2nd edn (enlarged), 1952, 26 maps, Buenos Aires ; Minist. Agric., 32 × 26 cm.

This Atlas [a detailed commentary is provided in Part 1 of the same publication, see previous abstract] contains maps illustrating : (1) temperature zones in summer and winter, with indications of the suitability of each major group of zones for the cultivation of various crops ; (2) rainfall zones with indications of seasonal distribution ; (3) climatic zones, with indications of natural vegetation ; (4) relationship between climatic zones and political divisions of Argentina ; (5) ecological zones for various cultivated plants, including wheat, linseed, maize, sunflower, groundnut, potato and lucerne, showing the suitability of each zone for the plant indicated and the necessity, if any, for irrigation ; (6) zones of intensity and rhythm of vegetal growth ; (7) natural vegetation ; (8) forage resources ; (9) soil zones ; (10) zones of soil humus-content.—W. J. Baulkwill.

NEWS ITEMS AND NOTES

Germany

1164 BUNT DISEASE. At the Working Party for disease control and resistance-breeding of cereals and leguminous crops held in Ingolstadt, Sept., 1954, the following papers (among others) were read: incidence of dwarf bunt [*Tilletia brevifasciens*] in relation to cultivation measures (by E. Sachs); results of 1954 experiments in the control of dwarf bunt (by K. Warmbrunn); the control of dwarf bunt with sprays and powders (by F. Wagner). The discussion which followed centred round the incidence of this disease in winter-sown crops, resistance of wheat varieties to dwarf bunt, and prevention of bunt disease by hot-water treatment of cereal seeds. *Z. Pflbau* 1954, Vol. 5, No. 4.—D.B.

Switzerland

1165 † SWISS AGRICULTURE. In honour of the 60th birthday of Jakob Landis, Director of the Division of Agriculture in the Federal Department of Political Economy, the *Landwirtschaftliches Jahrbuch der Schweiz* Vol. 69, No. 1 is devoted to a series of contributions of a general nature on Swiss agriculture, some in French, others in German. They include papers on the citizen and administration, technical progress and the improvement of living standards of the peasants, farm and land improvement, and international co-operation in agriculture and nutrition. *Landw. Jahrb. Schweiz* January, 1955.—D.B.

Italy

1166 SEED EXCHANGE. A list of seeds offered in exchange by the Istituto ed Orto Botanico, Università di Torino, includes many species of Leguminosae, Gramineae, Cruciferae and Chenopodiaceae, collected in 1954.—E.B.O.

Kenya

1167 SINGLE-STAGE PEDIGREE CEREAL SEED SCHEME. This scheme, which could be started in 1956, is designed to provide the farmer with an incentive to grow and sell good seed. Mother seed from the Department of Agriculture would be sold to a few selected farmers. The price of the seed would be high but payment could be deferred till after harvest and official release. Inspections would be made of: (a) the field prior to sowing; (b) the crop before harvesting (as at present); (c) the combine harvester before use on the crop; the first few bags harvested would be discarded. The seed harvested would be cleaned and stored on the farm, and samples would require testing. This pedigree seed would be sold on the open market, with no price restriction, and sent direct from grower to buyer. *K.I.O. Fortnightly* March, 1955, No. 291.—M.P.

Australia

1168 THE N.S.W. AGRICULTURAL RESEARCH INSTITUTE at Wagga was officially opened on 30 October, 1954. It will direct research into a wide range of agricultural problems and will concentrate in particular on wheat breeding, wheat quality and its relation to soil fertility. Field work will be conducted at Wagga Agricultural College and Experiment Station, Condobolin and Temora Experiment Farms and at selected private farms. *Agric. Gaz. N.S.W.* December, 1954.—M.P.

1169 RICE PLAN FOR THE NORTHERN TERRITORY. The Australian Government has given its support to a project, put forward by the large commercial banking syndicate, Mainguard Australia Ltd., to grow 150,000 ac. of rice in the Northern Territory. An area of virgin country near the Alligator River, where the black soil plain is flooded annually during the wet season, will also be cultivated. The company hope to plant 50 ac. in 1955. At a Government experimental station near by, rice has been grown successfully for 3 years. *Aust. agric. Newslett.* February, 1955.—M.P.